

**UTILIZATION OF PHYSICIANS  
IN SELECTED  
RURAL HEALTH CENTERS  
IN PUERTO RICO**

UTILIZATION OF PHYSICIANS  
IN SELECTED RURAL HEALTH CENTERS IN PUERTO RICO

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## INTRODUCTION

A shortage or total absence of physicians exists in most rural areas of the world. The realities of limited economic and educational resources, coupled with an expanding population, indicate that this situation is not going to improve in the near future. Even if the ratio of physicians to the total population were to be increased, there would probably be little improvement in the rural areas because physicians generally prefer the sophisticated medical and cultural attractions of the urban environments. With the increasing volume of medical knowledge, most physicians are electing to specialize and remain in urban areas rather than face the responsibility, physical hardship, professional isolation, and so-called cultural vacuum of rural medical practice.

It is generally recognized that ideal staffing patterns for rural health centers have been unattainable when utilizing the traditional physician-nurse roles. This is true for more developed countries, such as the United States, and even more so for developing countries. The net effect of adherence to traditional physician utilization has not only blighted the quality and quantity of care given in rural communities, but has especially prevented the expansion of health delivery programs to rural areas with demonstrated needs and no existing health care programs. The utilization of physicians in health services must be redefined to allow more efficient and effective health programs in the rural communities.

Even in the United States the percentage of graduating physicians electing rural practice is decreasing each year and the average age of existing rural doctors is increasing. A deterioration of rural medical care has already occurred. It is suggested that the chances of a reversal may be enhanced by a change in physician utilization. Information on how a rural physician uses his time would be helpful in developing any change in physician utilization.

Many training programs are developing new types of medical auxiliary personnel to assist in the provision of medical care. The future role of these new types of medical personnel is not clear at the present time. However, it is reasonable to assume that they will affect physician utilization. The rural physicians' collective judgments concerning the role of a new type of medical auxiliary would provide one essential type of opinion in determining their utilization in rural areas.

Such a study of rural physician utilization, combined with the rural physicians' judgments concerning which of their patients could be safely, efficiently, and acceptably taken care of by an individual with less training than a physician has been conducted. The data from this study should provide useful information for those individuals who have the responsibility of developing and operating rural health delivery systems.

### HYPOTHESIS

The hypothesis of this study was that many of the patients seen by physicians in rural health centers in Puerto Rico could be taken care of by lesser trained individuals under the supervision of physicians.

### OBJECTIVES

The objectives of this study were to:

1. Determine how the physicians utilized their time in the rural health centers in Puerto Rico.
2. Determine what type of patient care activities were performed by these physicians.
3. Determine the physicians' judgment for each patient seen as to whether the patient could be safely and efficiently taken care of by a lesser trained individual.

A medical care delivery system is complex and interrelated with many nonclinical variables, and in this study no attempt was made to consider all aspects of this system. Quality of care, accessibility of care, patient acceptance, legal and political parameters, motivational forces, and many other important operational and philosophical points were not explored.

### LITERATURE REVIEW

The physician has historically occupied the prime position in the delivery of health care. The special nature of the physician-patient relationship and the "art" aspect of medicine have tended to prevent the development of direct and objective measures of the physician's patient care activities. "Task analysis" or "time and motion" studies have not often been used in the study of physicians' activities. Indirect, internal measures of physicians' activities such as utilization review committees, tissue committees, and peer review have served useful purposes but they do not lend themselves well to determining physicians' actual patient care activities or to dissemination of this information. Furthermore, in busy, rural outpatient situations, where medical records may be minimal or nonexistent, it is difficult to apply indirect methods to assessing physician time utilization.

A direct method of determining rural physicians' activities is by personal interviews or questionnaires. This method was applied in gathering the information for The Health Center Doctor in India by Takulia, H. S., et al. (1). Although the aim of Takulia's study was not to examine directly the physician activities, the 39 health center

physicians included in the study were questioned concerning their activities in the health centers. Almost 90 percent of doctors stated that the time spent per patient was less than five minutes, with a third of this number saying they gave only 30 - 60 seconds per patient, and an equal number indicating that 1 - 2 minutes per patient would be their estimate. Even though the health center physicians were apparently overwhelmed by the volume of the patient load, when questioned, only one-third of the doctors indicated that they needed medical assistants, and one-seventh thought that medical assistants were not needed at all. Surprisingly, more than half said they did not know whether medical assistants were needed, perhaps an indication that the medical assistants' functions had not been clearly defined.

In 1967 Yankauer, et al. (2) reported on a mail survey questionnaire sent to 6,820 pediatricians in the United States. Physicians' activities, the amount of task delegation to allied health workers, and the physicians' opinions concerning task delegation were investigated. The authors stated that mail questionnaires were apt to be inaccurate or overstated; however, the results of the study tended to agree with comparable studies. The average office hours per week for a pediatrician were determined to be about 35, with about 110 office visits by patients. One half of the respondents reported well



baby ("health supervision") visits ranging from 15 to 19 minutes and one-third less than 15 minutes. Two-thirds of the respondents reported the average visits of sick babies ("illness visits") to be less than 15 minutes. The utilization and opinions concerning the use of allied health workers were extensively investigated in the survey. A number of individual tasks were listed on the questionnaire and the prevailing attitude of the physicians was that many of the tasks could and should be delegated to adequately prepared allied health workers. Delegation was neither intended nor perceived by the respondents to mean delegation of complete responsibility, or delegation at all times and under all circumstances.

A limiting factor of mail questionnaire surveys is that individual circumstances or patient characteristics which affect the time and skills necessary for the delivery of patient care cannot easily be determined. It is logical to assume direct observation of physician activities is a more accurate means of assessing physician utilization.

In 1950, the Yale Public Health Personnel Research Project developed a time study method to determine actual time distribution of staff activities. A broad, functional classification of activities was developed which categorized services rendered by community and state health department personnel. Employees coded their activities

on a daily time log. Working time in each functional category was determined, and the hypothesis that many trained public health professional workers spent much time on activities for which they had not been trained was confirmed. The authors concluded that some of these activities should be shifted to other workers or that the personnel performing them should be given appropriate training (3) (4) (5) (6) (7). The time study method lends itself well to the study of time distribution of public health activities. It would appear difficult to adapt this method to a busy patient care situation if individual sub-components of the physicians' patient care activities were also needed. Not only would it be time-consuming on the part of the physician, but "Skinnerian bias" would be introduced into the physicians' activities.

One pioneer study involving direct observation and recording of a physician's activities was performed by Payson et al. in 1961 (8). Two medical interns were observed by a third-year medical student with a stop watch for ten consecutive days. The interns' activities were recorded in five separate categories:

- "1. Intravenous therapy
2. Patient and relative contact
3. Communication with medical staff
4. Ancillary services
5. Personal activities"

It was concluded that in the observations of the physicians' activities bias introduced by the presence of an observer, if present, either extended for the entire period of the study or did not discriminate against either intern. Time was recorded in minutes and seconds, but some difficulty in reading the stopwatch and in recording the time was reported. The study involved only analysis of broad time utilization categories and did not incorporate details of physician activities or other medical determinations. The authors commented that they were surprised to find the small amount of interns' time that was spent in actual patient and relative contact.

A time and motion study on four practicing urban pediatricians was reported by Bergman et al. in 1966 (9). A fourth-year medical student accompanied the physicians for a total of eighteen days to observe how their working day was spent. An average of 48 percent of the day was spent with patients, 12.5 percent talking on the telephone, and 9 percent in administrative work. Fifty percent of the patient time was spent with well children and 22 percent on children with minor respiratory complaints.

A Taiwan study by Y. T. Yen (10) entitled The Functional Analysis of Health Center Activities measured, among other things, the functions and activities actually performed by the physicians in thirteen

health centers, including nine rural health stations. Dr. Yen, Secretary, Medical Education Commission, Ministry of Education, Taipei, Taiwan, Republic of China, carried out this study in cooperation with the Department of International Health of the School of Hygiene and Public Health, the Johns Hopkins University. In it, medical students observed and recorded the activities of physicians and other health center personnel once every hour. The classifications of activities and the percentage of total physician time in each category was as follows:

" Personal affairs	49%
Office work	16
Clinical work	35
Supervision, liaison	7
Home visits	1
Immunizations	--
Health education	2
Sanitation	<u>&lt;1</u>
Total	100%

With hourly observations one observer can study several individuals at the same time; however, it does not allow detailed analysis of individual physician activities.

The study by O. L. Peterson (11) of 90 rural physicians in general practice in North Carolina incorporated direct observation by two other physicians. Two portions of this complex study are of particular interest here. The physician-observers found great variation in the length of the individual physician's work day: 3 hours to 16 hours, for an average of 9.3 hours per day. Another point of interest was the use of physician-observers to ordinally rank qualitative components of the physicians' patient-care activity. The two observers ranked the study physicians on a scale of I (low) to V (high) for clinical history, physical examination, use of laboratory aids, use of therapeutic measures, preventive medicine and clinical records. A qualitative ranking by a system of numerically-weighted judgments on each of the above categories was also performed with each physician. The study determined that these two methods of measuring the quality of physicians' activity resulted in essentially the same quality classification of the physicians' patient-care activities, and there was a full range of the quality of care among the study physicians.

The North Carolina qualitative measurements involved check-off lists for each category, and in some cases, actually transcribing the patient's history verbatim. In extremely busy clinic situations it would be difficult to record this much qualitative information during the brief time physicians spent with each patient.

In 1970 the author of this present study spent three days in Malaysia with World Health Organization staff personnel who were conducting a study of Malaysia's local health services. Dr. R. L. Manning, chief of the project had previously completed a study concerning the local health services in Taiwan. Although printed material was not available, informative discussions and observations were possible. (The results of these studies, performed in cooperation with the Malaysian and Taiwanese governments, were considered to be internal documents, and could not be released without official clearances.)

The Malaysia study involved complex assessment techniques and was designed to investigate numerous parameters of the health system ranging from medical education to patient satisfaction. One aspect of the study involved observation, timing, and recording the health center physician's activities by an observer physician who accompanied the health center physician for selected one-half day periods. The health center physician's patient-care activities were recorded in detail for each patient. Time per patient was measured to the nearest one minute, using a wrist watch. Direct observations of the physician's activities were not made when he was performing activities other than direct patient care.

In this study, the health center physicians' patient care activities did not appear to be disturbed by the presence of the observer. Due to the short time per patient and the difficulty of accurately reading wrist watches it appeared to be more accurate to record the time observations in smaller units than minutes, e.g., 1/10 minute.

The preceding review of the literature has dealt only with the studies involving physicians. There have been many studies involving working activities of nurses, e.g., N. Reid's study of auxiliary nurse-midwives in India (12); B. M. Darbyshire's guide to the study of activities of hospital health personnel (13); F. G. Abdellah and E. Levine's study of nursing personnel by work sampling (14); J. H. Mors' article on applications of work sampling in nursing service (15); and P. N. Dixon's study of the work of a nurse in a health center treatment room (16). Similar articles dealing with other types of work evaluations are: R. B. Miller's work on task description and analysis (17); his article on task taxonomy (18); and J. E. Zerga's resume and bibliography on job analysis (19).

Although review of these study techniques has been valuable, it has not been considered appropriate to present detailed comments on them here because this study involves only the area of physician activities.

## STUDY AREA

### PUERTO RICO

Puerto Rico, the most easterly of the Greater Antilles Islands, is shaped like a rectangle and has an area of approximately 3,435 square miles. About 75% of the island is mountainous or hilly with a narrow coastal plain comprising 25% of the land. The mean temperatures for the island throughout the year average between 73 and 79 degrees, and average rainfall varies greatly between the wetter mountainous area and the low-lying coastal plain. The present population is approximately 2.9 million people. Spanish is the language commonly spoken, although a high proportion of the population also speak English.

Historically, Puerto Rico has had an agricultural economy, but during the past few decades there has been a rapid expansion of manufacturing activities, and more recently, increased tourism has become a larger contributor to the economy. Puerto Rico has undergone remarkable social and economic changes, progressing from a very low economic level at the beginning of the century, to what is the highest in the Caribbean at the present time. The per capita gross national product in 1971 was \$1,340 and is increasing steadily.

Puerto Rico is politically related to the United States as a Commonwealth, which results in a number of economic and governmental



links, and its people enjoy common citizenship with the United States. The island Government is effectively concerned with the stimulation and coordination of many diverse aspects of social and economic development and offers a wide range of official services, including comprehensive health services.

#### THE HEALTH DEPARTMENT

The Commonwealth Government of Puerto Rico has provided coordinated public health services at the local level since 1926, when the first public health facility was established in the former city of Rio Piedras. Construction of health and welfare centers was initiated in 1949, with funds appropriated by the Island Legislature. Under a framework of progressive regionalization, the Health Department developed the concept of providing comprehensive health care based on the health centers, which were to be located in each municipality. A health center was visualized as the local health care facility in which individuals could receive integrated preventive medical services, curative medical services, rehabilitation services and other social welfare services (20).

It is here noted that in Puerto Rico there are many physicians in private practice and private hospitals. Since this study deals only with the government health centers the private sector is not discussed.

The Department of Health divided the island into five separate administrative regions. Within each region, a three-level medical care system now exists and can be described as follows: (21)

1. At the local or municipal level, a health center offers primary outpatient and limited inpatient medical care with basic facilities for emergency, pediatric, and obstetrical services, with appropriate social welfare components.
2. At the subregional level, a small general hospital with facilities for comprehensive medical care of a more specialized nature is provided.
3. The regional level consists of complex Medical Centers established in San Juan, Ponce, and Mayaguez which offer highly specialized services in all five regions.

Impressive improvements in public health and vital statistics in Puerto Rico have accompanied the development and operation of the regionalized health system.

1. Crude death rates have declined from 20.9 per 1,000 population in 1937, to 6.0 in 1971.
2. Infant mortality has declined from 138.5 per 1,000 live births in 1937, to 29.0 in 1971.
3. Deaths from deliveries and complications of pregnancy, childbirth, and the puerperium have declined from 7 per 1,000 live births in 1932, to around 0.5 per 1,000 live births in 1967.

4. Life expectancy at birth has increased from 46 years in 1940 to 70 in 1963.

The Department of Health has maintained the basic objectives of regionalized, comprehensive, integrated health care while undergoing internal modifications designed to improve services.

Three important decisions or events occurred in 1967-1970 which will affect the health system:

1. The Health Department's five-region system is going to be reorganized into a three-region system. Each of these three regions will be divided into various sub-regions (22). (Figure 1) There will undoubtedly be changes in operating policies when the reorganization takes place, e.g., patient referral policies and personnel staffing patterns.
2. The Puerto Rican Comprehensive Medicine Act (Act 56) signed into law on June 21, 1969, includes the following provisions which will directly affect the public hospitals and health centers (23).
  - a. To open public hospitals to the entire population but require a partial or total charge for hospital care for those individuals or families whose annual incomes and other financial resources do not permit



them to be classified as eligible to receive these services at public expense.

- b. To allow private physicians to refer patients to and to treat their patients in public hospitals and to permit physicians belonging to medical staffs of health institutions operated by the commonwealth to care for their private patients in public hospitals.
  - c. To authorize the Secretary of Health to sign agreements with nonprofit groups and institutions; to allow these to administer and operate hospitals and health centers owned by the State, and
  - d. To authorize the Secretary of Health to sign contract agreements with physicians and private institutions so that these may offer and be reimbursed for medical and hospital care to individuals and families certified as eligible to receive such care at public expense.
3. Welfare services were removed from the Department of Health and placed in a new Department of Welfare with equal administrative status. This change in organizational structure may in the future affect the

integration and coordination of health and social service activities in the health centers.

This study was concerned only with the utilization of physicians for curative work in the rural health centers, therefore a detailed description of other components of the health system is not presented.

As of 1972, the Health Department operates local health centers in 69 municipalities, and although no two health centers are exactly the same, they all possess certain characteristics in common. A selected list of typical characteristics of the health centers is as follows:

1. Objectives - A health center is designed to provide comprehensive, integrated primary medical and welfare services for about 30,000 people. This includes general outpatient and limited inpatient medical care, with referral of patients to subregional or regional medical centers for medical problems beyond the capability of a local health center. Emergency medical services are provided by physicians, i.e., 24 hours a day.
2. Physical Plants - These include outpatient and simple emergency room facilities, one inpatient per 1,000 population served (20-40 inpatient beds), obstetric and surgical suites, and two to four ambulances per

center for transportation of referral patients to more sophisticated medical centers. There may or may not be operational X-ray and laboratory facilities available in the health center.

Health center construction has been carried out under centralized Health Department planning and has benefited from Hill-Burton funds as well as funds from the Government of Puerto Rico.

3. Administration - The Medical Director of each health center is directly responsible to his Regional Director, who in turn is responsible to the Secretary of Health. The Medical Directors must also coordinate health center activities with their local municipal governments.
4. Personnel - There are two to six full-time physicians assigned to each health center, depending on size of the population served. There is difficulty in finding physicians to staff the allotted positions (23) (24). Specialty physician consultation visits may or may not be available. There are four to nine registered nurses assigned to each health center, but often there are many vacancies and the number employed is far less than authorized or desired. One or two nurse-midwives are usually employed. There are four to nine licensed practical nurses, with varying degrees of

responsibility. Sanitarians, nurses aides, clerks, secretaries; janitorial staff, ambulance personnel and other support personnel are present in varying numbers based on the size of the center.

5. Referral of Patients - Ambulance services to the health centers and from the health centers to the designated referral hospitals are provided 24 hours a day. The ambulance driving time between any health center and its referral hospital ranges from 15 to 60 minutes. The ambulances are designed to carry more than one patient and depending on the severity of the patients' conditions, nurses may accompany them.

Those patients who do not need emergency referrals are usually given appointments which they attend by means of public transportation.

6. Funding Support - Approximately fifty percent of a local health center's operating budget comes from municipal taxes and fifty percent from the Department of Health of the Commonwealth Government. Doctors and registered nurses are paid by the Commonwealth Government while all personnel classified at lower professional and responsibility levels are paid directly



by the municipal government concerned.

Services are given at no charge or only a token charge to patients classified as indigent. The Puerto Rican Health Department is reimbursed by the Department of Health, Education, and Welfare for a portion of the cost of the medical services provided.

#### NORTHEAST HEALTH REGION

Thirty-four percent of the total Puerto Rican population lives in the Northeast Health Region (Figure 1). Metropolitan San Juan and the University of Puerto Rico Medical School in Rio Piedras are located in this region. There are fourteen health centers in the Region and the University Hospital in Rio Piedras is the designated regional hospital for referral of patients from the health centers. The incorporated city of San Juan is a separate administrative area for the Department of Health and does not come under the authority of the Director of the Northeast Health Region.

With the cooperation and assistance of Dr. Jose Nine Curt, Dean of the School of Public Health, University of Puerto Rico, and Dr. Roza Azmar, Deputy Director of the Northeast Region, seven health centers were selected in which to make this study. These health centers were considered to be representative of the rural centers of

Puerto Rico and did not include the larger urban health centers in Bayamon, Carolina, and Guaynabo. There are four other rural health centers in the Northeast Health Region which were not included in this study because of lack of time and because it was considered that the sample studied was sufficiently large. A list of the health centers where the study was performed is shown in Table 1.

All of the twenty-two physicians in these health centers who worked in the outpatient clinics or emergency rooms on a permanent, full-time basis were included in the study.

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TABLE 1

NAME, MUNICIPALITY POPULATION, NUMBER OF BEDS, AND  
NUMBER OF PHYSICIANS FOR THE SEVEN STUDY HEALTH  
CENTERS IN THE NORTHEAST REGION OF PUERTO RICO,

Name of Health Center	Municipality Population - 1970	Number of beds	Number of Physicians
Catano	26,056	under construction*	2
Comerio	18,738	22	3
Corozal	24,194	20	3
Dorado	17,264	14	3
Toa Alta	18,537	22	4
Toa Baja	46,938	20	4
Trujillo Alto	30,351	19	3

\* A new center was under construction; former houses with no beds were being used temporarily for clinical work.

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The Northeast Health Region of Puerto Rico was selected as the study area for the following reasons:

1. Puerto Rico is considered to have a unique combination of socioeconomic characteristics which are comparable to both the United States and Latin American countries.
2. The Puerto Rican Department of Health has a long experience which is well documented. The Department is presently undergoing organizational changes and the information from this study could be helpful to the individuals responsible for making the anticipated changes.
3. The regionalized health system of Puerto Rico is often cited as a desirable model for a rural health delivery system and the Northeast Health Region has a well developed regional system.
4. The Northeast Health Region is considered to have health centers which are representative of all of Puerto Rico, and the responsible personnel in this area kindly agreed to assist in carrying out the study in the selected health centers.

## METHODOLOGY

The method used for collecting data involved a physician observer in the company of the study physicians at all times while in the health centers. The observer noted selected information on a pre-tested coded form, termed the study instrument (Annex 1). Information was recorded without consultation with the study physicians. An effort was made to allow the study physicians' work to be as normal as possible. Each study physician was requested to record independently a judgment number and a list of medications prescribed for each patient on a separate pre-numbered form.

## THE STUDY INSTRUMENT

The study instrument was developed, following revisions, after three field tests with physicians in outpatient clinics in New Orleans and Puerto Rico. The study instrument form was reproduced on 8½ by 14 inch paper and was carried on a clip board for ease of recording information during the observations.

### Identification Section

A confidential numerical identification code for the physician being observed was recorded as well as the current day, month and year. The time of day that the first and last observed activity began

was noted in a space providing for hours and minutes.

#### Time and Activity Section

Timed observations were recorded during all periods that the observer was in the company of a study physician. The time utilized for each type of activity was measured by using a stopwatch, and noted in minutes and 1/10 minutes. Each recorded time was classified as to type of physician's activity, time of day, and by location as follows:

##### 1. Types of Physician's Activities

- a. Direct patient care - physician in company of a patient involved in history taking; physical examination, diagnosis, treatment; or supervision of a team effort involving patient care.
- b. Medical administration - physician performing paperwork not directly related to patient care; involved in medical staff discussions; talking with drug salesmen; or other medical activities not directly related to patient care.
- c. Medically related waiting or travel time - physician waiting between patients; no patients available; or

walking between one section of the clinic and another to perform an activity.

d. Non-medically related or wasted time - physician involved in personal activities, e.g., personal telephone calls, business discussions or bank visits.

e. Eating time - physician involved in eating a meal; a coffee break; resting after a meal.

2. Time of Day at which the Activities Occurred

a. AM - 8:00 to Noon

b. PM - 12:01 to 5:00

c. Night - 5:01 to 8:00 the following day

3. Location of Physician's Work

a. General outpatient clinic or dispensary

b. Emergency room or area designated for emergency patients.

c. Inpatient or hospital section of the health center, e.g., hospitalized patient's room and nurse station.

d. Specialty clinic - clinics in which the physician worked where only a special type of patient was scheduled, e.g., diabetic clinic, preschool clinic,

- chronic disease clinic, or family planning clinic.
- e. Surgery or delivery rooms.
  - f. Other locations within the health center, e.g., kitchen, X-ray, physician's office or sleeping room.
  - g. Outside the health center, e.g., parking lot; health center yard; walking in the street nearby the health center.

#### Judgment Section

The total time a study physician spent in diagnosing and treating each patient was recorded as a single activity. Immediately on completing the care of each patient the observer and the study physician independently made a professional judgment as to whether a physician or a lesser trained person could have safely and effectively diagnosed and treated the patient. The judgment was limited to one of four classifications which were available in printed form for reference during the patient care session. The judgment classifications had been carefully explained and discussed with each study physician prior to the beginning of the activity observations. For each patient, the observer recorded a judgment number on a separate pre-numbered paper. The description of the judgment categories including the corresponding judgment numbers are as follows:

1. Activity should be performed by a physician.
2. Activity could be safely and effectively performed by a lesser trained person who could:
  - a. Take histories and conduct physical examinations on patients and make supervised medical decisions.
  - b. Prescribe commonly used antibiotics only, e.g., penicillin, tetracyclines or erythromycin.
  - c. Prescribe other selected items, such as topical applications, non-narcotic cough medicines, antipruritics, selected anti-helminthics, and immunizations.
  - d. Suture minor lacerations and treat minor injuries.
  - e. Perform laboratory, nursing and other activities.
  - f. Give preventive medical advice and make selected referrals.
3. Activity could be safely and effectively performed by a lesser trained person who could:
  - a. Take limited histories and conduct physical examinations on patients and make limited medical decisions.
  - b. Prescribe selected non-antibiotic items and non-



prescription drugs such as aspirin,  
topical applications, available drug-  
store or home treatments, antipruritics  
or give immunizations.

- c. Treat minor injuries not requiring su-  
tures, order X-ray or laboratory work.
  - d. Perform selected laboratory, nursing,  
and administrative procedures.
  - e. Give preventive medicine advice.
4. Activity could be safely and effectively performed  
by a lesser trained person who could perform first  
aid and specifically directed activities in the center.

#### Patient Identification Section

Each patient seen by a study physician was given an identi-  
fying number I through XX, in chronological order of appearance before  
the study physicians. This number was registered on the study instru-  
ment and corresponded with the patient number on the separate pre-  
numbered form where the study physician recorded his judgment num-  
ber and treatment for each patient.

### Age

The age of each patient was determined from available records or estimated by the observer and recorded on the study instrument in one of the following five categories:

1. 0 - 4 years
2. 5 - 14 years
3. 15 - 44 years
4. 45 - 64 years
5. 65+ years

### Sex

The sex of each patient was recorded.

### Medical Record

The previous medical information available from patient records to the study physician on each patient during diagnosis and treatment was determined by the observer. This determination was classified into one of the following four categories and recorded on the study instrument:

1. Previous medical record not in the physician's possession at the time he saw patient.
2. The previous medical record was not in physician's possession at the time he saw the

patient, but the physician was familiar with the patient and his present medical complaints from previous visits.

3. The previous medical record was available to the physician at the time he saw the patient.
4. The primary diagnosis was previously established in the patient's medical record which was available to physician at the time he saw the patient.

### Diagnostic Procedures

The observer recorded five separate events concerning the physician's work with each patient prior to making a diagnosis. The five categories of observations were independent of each other and were considered to be an estimate of some of the measurable components used by the study physician in developing the patient's diagnosis. The observations were quantitative and no effort was made to apply qualitative measures to the diagnostic components. Observations on each patient were classified and recorded on the study instrument in one of the following categories:

#### History

1. The study physician spent less than one minute

talking with the patient before writing down the diagnosis.

2. The physician spent more than a minute but less than five minutes talking with the patient only about the patient's primary complaint.
3. The physician spent more than five minutes talking with the patient directly or indirectly about the patient's primary complaint.
4. The physician spent more than five minutes talking with the patient and/or was concerned with other than the patient's primary complaint.

#### Temperature, Pulse Rate, and Blood Pressure of the Patient

0. No measurements made by the physician.
1. Temperature only.
2. Pulse rate only.
3. Blood pressure only.
4. Temperature and pulse rate only.
5. Blood pressure plus temperature or pulse rate.
6. Blood pressure, temperature and pulse rate.

#### Physical Examination of the Patient

0. No examination

1. Physician performed a minor examination of the affected area only, e.g., throat examination, palpation of an extremity, auscultation through clothing.
2. Physician performed a minor examination involving the affected area of chief complaint plus an additional area, e.g., throat examination, and ear examination.
3. Physician performed a major examination, e.g., patient required to remove clothing; multiple areas examined, or the examination was longer than five minutes' duration.

#### Laboratory Work

Laboratory examination ordered or performed by the physician with results available prior to treatment of the patient:

0. None
1. Complete blood count or various components, e.g., hemoglobin, hematocrit, differential count, white blood count, or sedimentation rate.

2. Urinalysis of a routine nature, e.g., microscopic examination, protein or sugar content, specific gravity or pH determination.
3. Stool examination for ova and parasites.
4. Other laboratory examinations not listed above.  
Laboratory examinations ordered by the physician, but the results not available to the physician prior to the treatment of the patient.
5. Complete blood count or various components.
6. Urinalysis of a routine nature.
7. Stool examination for ova and parasites.
8. Other laboratory examinations not listed above.

#### X-ray of the Patient

0. None
1. X-ray ordered by the physician, but the results not available prior to the treatment of the patient.
2. X-ray results available to the physician prior to the treatment of the patient.
3. Preventive medicine or screening X-ray, not indicated for evaluation of the patient's primary complaint.

4. Patient referred to another facility for X-ray examination, and results not available to the physician during the current visit of the patient.

### Diagnoses

The Department of Health required physicians to document a diagnosis for each patient they saw in the health centers on a Puerto Rican Social Assistance Program Form. The observer copied this diagnosis on the study instrument for the patients seen by the study physicians.

Prior to analysis of the information on the study instrument all diagnoses were coded by a certified medical records librarian according to the 1965 Revision of the International Classification of Diseases. All diagnoses were coded according to the List of Three-Digit Categories and also according to Special Tabulation List C, i.e., List of 70 Causes for Tabulation of Morbidity (25).

Only one diagnosis was recorded for each patient and no provisions were made for multiple diagnoses or for evaluation of the accuracy of patient diagnoses. The study physicians normally wrote only one diagnosis on the Social Assistance Form from which the diagnoses for this study were obtained; a request to have them record multiple diagnoses would have disrupted their normal patient care activities. This study was designed to determine the actual activities of the physicians and not the qualitative aspect of patient diagnoses.

### Treatment

The observer recorded four separate categories of treatment or advice given for each patient seen by the study physician. All recorded observations were quantitative in nature and no attempt was made to make qualitative evaluations. The three parts of the treatment section of the study instrument which involved only recording observations of the study physicians' activities were as follows:

#### Procedures

Medical procedures performed on a patient by the study physician were classified into one of nine separate categories and recorded;

1. Incision and drainage of infected area.
2. Removal of sutures from a lesion which had been sewn at some previous time.
3. Suturing of a lesion which involved no significant arterial or nerve damage and was not considered to be particularly difficult.
4. Suturing of a lesion which involved significant arterial, nerve or tendon damage; required more than 30 sutures; or was judged to be particularly difficult.



5. Wound dressing or bandage changed only.
6. Lumbar puncture performed.
7. Transfusion of solutions started.
8. Insertion of naso-gastric tube.
9. Performance of procedures not listed above.

#### Advice

This category was included in an attempt to measure subjectively and record the amount of advice and instructions given to each patient. The observer classified advice into one of the following four subcategories and recorded it on the study instrument:

1. Minimal advice and reassurance, e.g., patient simply handed a completed prescription with no verbal instructions from the study physician.
2. Study physician gave only instructions on how to utilize the prescribed medications to the patient, e.g., "Take this medicine three times a day."
3. Study physician described to the patient the diagnosis and/or treatment more than superficially, e.g., "Take this medicine four times a day. It may upset your stomach so drink some milk with it. You should not drive your car while you are taking this medicine."
4. Study physician gave preventive advice to the patient as well as describing the diagnosis and treatment

number for each patient. When the drugs were known to the observer he also wrote the names of the drugs utilized for each patient. Comparison of the recorded names of drugs used for each patient helped to prevent errors later, when transferring the physician's recorded judgment number from the pre-numbered paper to the study instrument.

After completion of the field studies, all drugs used by the study physicians were listed, and an attempt to identify them by content or chemical name was carried out.

The drugs were then classified into sixty categories according to their listing and description in the 1971 Drug Evaluations (26). Each classification was given a code number, and this code number was recorded on the study instrument for each patient. A list of all the drugs prescribed by the study physicians as well as their assigned classification and code number is found in Annex 2.

#### PHYSICIAN PROFILES

A physician profile form (Figure 2) was filled in for each physician in the study. The information for this form was collected by directly questioning the physicians and/or was provided by the office of the Northeast Regional Health Director, who was the supervisor of the study physicians. The form was intended to provide some information about study physician characteristics which would be useful in inter-

## PHYSICIAN PROFILE FORM

Physician's Name \_\_\_\_\_

Present Home Address \_\_\_\_\_

Nationality of Birth \_\_\_\_\_

Date departed country (if other than P.R. or U.S.) \_\_\_\_\_

Present Citizenship (Date if U.S.) \_\_\_\_\_

Medical School Training

Name \_\_\_\_\_

Location \_\_\_\_\_

Number Years Attended \_\_\_\_\_

Graduation Date \_\_\_\_\_

Date of Arrival in Puerto Rico \_\_\_\_\_

Puerto Rican Health Department Work

Date Begun \_\_\_\_\_

Name of Health Centers	Begun	Ended
_____	_____	_____
_____	_____	_____
_____	_____	_____

Present Personnel Classification \_\_\_\_\_

Present Title in Health Center \_\_\_\_\_

Date Begun \_\_\_\_\_

Licensure Status in Puerto Rico

Puerto Rican License \_\_\_\_\_ Date \_\_\_\_\_

E.C.F.M.G. \_\_\_\_\_ Date \_\_\_\_\_

Other Country License \_\_\_\_\_ Date \_\_\_\_\_

Present Licensure Status \_\_\_\_\_

Other Noteworthy Information \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

preting the information contained in the study instrument and perhaps in developing recommendations concerning physician utilization.

#### ANALYSIS OF THE STUDY INFORMATION

After completion of all observations, the data were brought to New Orleans for analysis. The information recorded on the study instrument was in numerically coded form and was key-punched on IBM cards, verified, and then transferred to magnetic tape. Individual computer programs were prepared for analysis of the data at the Tulane University Biomedical Computer Center on an IBM 744 Computer.

### CHARACTERISTICS OF THE STUDY PHYSICIANS

The information for the Physician Profile Form (Figure 2) was collected for each of the twenty-two physicians included in the study. The summarized information is presented below; the figures represent the number of physicians in each category.

#### Place of Birth

Puerto Rico . . . . .	10
Dominican Republic . .	7
Cuba . . . . .	4
Argentina . . . . .	1

#### Citizenship at the Time of the Study

United States . . . . .	13
Dominican Republic . .	7
Cuba . . . . .	1
Argentina . . . . .	1

#### Location of Medical School Training

Dominican Republic . .	8
Spain . . . . .	6
Cuba . . . . .	3
Mexico . . . . .	2
Argentina . . . . .	1

United States . . . . . 1

Unknown . . . . . 1

Length of Time Employed by the Health Department

Less than 1 year . . . . . 7

One to five years . . . . . 11

Greater than five years . . . . 4

Type of Puerto Rican Medical Licensure

Permanent . . . . . 6

Provisional<sup>1</sup> . . . . . 16

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<sup>1</sup> Provisional License to practice medicine is valid only for practice within the Department of Health, e.g., in health centers.

In order to obtain a permanent license to practice medicine a physician must be a U. S. Citizen, pass the required Puerto Rican qualifying requirements, and complete one year of public service with the Department of Health.

Location of Residence

Lived in the municipality  
 where the health center  
 in which they worked was  
 located . . . . . 3

Lived in the metropolitan  
 area and commuted to the  
 health center where they  
 worked . . . . . 19

Age

Less than 40 years of age . . . 11

Greater than 40 years of age . 11

Although this study was not concerned with the quality of care, the preceding information is presented to permit an understanding of the backgrounds of the study physicians. All study physicians' judgments were considered equal when analyzing the data because they in fact had equal responsibilities for patient care.

## RESULTS

### GENERAL COMMENTS

The following results were obtained while observing twenty-two physicians working in seven rural health centers in the Northeast Health Region of Puerto Rico (Fig. 1). The study observations were made between December 21, 1970, and September 20, 1971. During this time there were several periods in which no observations were conducted, because of the author's other commitments. Health center physicians' activities were observed for a combined total of 28,995.7 minutes (483 $\frac{1}{4}$  hours).

The physicians were divided into two separate cohorts. Cohort 1 consisted of eleven physicians working in three health centers. These physicians were each observed for five days from the time they arrived in the health centers until they departed, a total of 55 days. On five of the 55 days involved, observations were carried out after 5 p.m. Excluding night duty, the eleven physicians averaged 5.0 hours per day in the health centers. The physicians' work schedules involved night coverage with occasional compensatory absence the following day and sometimes there were other reasons for their absences from the health centers. Consequently it was found that an average of six days was



required in order to complete observations on five normal working days with each health center physician. This was considered to be an inefficient utilization of the observer's time and therefore a different basis for selection of the observation times was used for the remaining physicians.

Cohort 2 was composed of eleven physicians working in four health centers. These physicians were observed during the day and night while they were in the health centers until they each cared for at least 100 patients. This method of selection allowed observations to be carried out on whichever physician was present in the health center rather than waiting for one previously selected. It was possible to include a larger number of physicians in the study using this method of selection and the data will show that there was little difference between the two cohorts in the average time spent on each activity.

#### PHYSICIAN TIME UTILIZATION

The percentages of the total time each physician was observed in various health center locations is displayed in Figure 3. The percentages of the total observation time for all physicians in each location were as follows:

Outpatient Clinics	45.5
Emergency Rooms	18.5
Specialty Clinics	2.5
Other Health Center Locations	<u>33.5</u> 100.0

The category "other health center locations" includes time recorded in four categories on the study instrument: inpatient or hospital care, surgery or delivery room, health center-other, and outside the health center. The 731 minutes of observation outside the health centers were almost all for eating-related activities during the noon hour. Only 4.5% (157) of the total patients cared for were seen in the combined categories of "specialty clinics" and "other health center locations"; the increased difficulty in presenting an individual analysis of these categories was considered prohibitive when compared with the benefit derived. The major portion of time in other health center locations represents time spent in the dining rooms or the physicians' night call rooms.

The second cohort of physicians was observed to spend a higher percentage of their time in the emergency room and in other health center locations. This was because they were observed more at

night when all patients were classified as emergency room patients. Also, at night when there were no patients the physicians tended to wait in the physicians' night call rooms rather than stay in the emergency rooms.

The amount of time which physicians spent in each location of the seven study health centers is presented in Table 2. This information is also shown in Figure 4. The time of day that observations were carried out is presented in Figure 5 as a percentage of each physician's total observation time and in Figure 6 as a percentage of total observation time in each health center. The actual amount of observation time in each health center, by time of day, is shown in Table 3.

#### Physician Activities

The percentage of the total time each physician was observed in five different activity categories is shown in Figure 7. The average activity distribution for all observed physician time was:

Direct Patient Care	47.4%
Administration	10.2%
Medically-related waiting	25.3%
Personnel	0.3%
Eating Related	<u>16.8%</u>
	100.0%

TABLE 2

THE AMOUNT OF TIME PHYSICIANS WERE  
OBSERVED IN FOUR CATEGORIES OF LOCATION IN EACH  
OF SEVEN RURAL HEALTH CENTERS IN PUERTO RICO IN 1970

Health Center Number	Number of Physicians Observed	Time in Minutes				Other Health Center Locations
		Total Time Observed	Outpatient Clinic	Emergency Room	Specialty Clinics	
1	4	4,618.1	2,377.7	557.3	148.9	1,534.2
2	4	7,396.2	4,667.5	335.7	166.4	2,226.6
3	3	5,775.1	3,968.3	259.5	67.5	1,479.8
4	3	2,703.2	266.3	1,180.8	81.5	1,174.6
5	2	1,563.4	401.7	617.3		544.4
6	3	3,398.5	948.3	1,078.3	107.5	1,264.4
7	3	3,541.2	546.0	1,327.9	165.3	1,502.0
Cohort 1	11	17,789.4	11,013.5	1,152.5	382.8	5,240.6
Cohort 2	11	11,206.3	2,162.3	4,204.3	354.3	4,485.4
Total Time Observed		28,995.7	13,175.8	5,356.8	737.1	9,726.0

TABLE 3

THE AMOUNT OF TIME PHYSICIANS WERE  
OBSERVED DURING THREE PERIODS OF THE DAY IN EACH  
OF SEVEN RURAL HEALTH CENTERS IN PUERTO-RICO IN 1970

Health Center Number	Number of Physicians	Total Time Observed	Time in Minutes		
			Morning 8 to Noon	Afternoon Noon to 5pm	Night 5 pm to 8 am
1	4	4618.1	2380.1	1928.2	309.5
2	4	7396.2	3798.3	3036.6	561.3
3	3	5775.1	3116.6	2658.5	
4	3	2703.2	625.6	1029.3	1048.3
5	2	1563.4	760.7	802.7	
6	3	3398.5	852.7	1297.7	1248.1
7	3	3541.2	1169.6	1578.1	793.5
Cohort 1	11	17,789.4	9295.3	7623.3	870.8
Cohort 2	11	11,206.3	3400.6	4707.8	3089.9
Total Observed Time	22	28,995.7	17,703.9	12,321.1	3960.7

The amount of time individual physicians spent in different activities in the health centers varied considerably. This was because of a difference in physician working habits as well as a difference in the type of work assigned to each physician. For example, one physician may have been assigned to a family planning clinic with only a few patients while other physicians in the same center were working in the busy outpatient clinic.

The total amount of time the physicians were observed in each activity in the seven study health centers may be seen in Table 4. The combined physician activities in each health center are displayed as a percentage of the total observation time in Figure 8. There was less variation in the percentage of time in each activity by health centers than by individual physicians. The time analysis at each activity by health center combined all of the individual work assignments for each physician. The health centers tended to have similar clinics and responsibilities, thereby reducing the variations in physician activity caused by the nature of the work assignments of individual physicians.

The percentage of the total time physicians spent on different activities during three different periods of the day is presented in Figure 9. "Direct patient care" during the night was almost always

classified as emergency room care. The higher percentage of "medically-related waiting" represents the longer periods of time which passed in between the treatment of these patients, especially later at night.

TABLE 4

THE AMOUNT OF TIME PHYSICIANS WERE OBSERVED IN FIVE  
ACTIVITIES IN EACH OF SEVEN RURAL HEALTH CENTERS IN PUERTO RICO IN 1970

Health Center Number	Number of Physicians	Time In Minutes					
		Total Time Observed	Direct Patient Care	Administration	Medically Related Waiting	Personnel	Eating & Eating- Related
1	4	4618.1	2625.3	467.3	1081.7	68.0	375.8
2	4	7396.2	2731.9	847.0	2157.3	33.0	1627.0
3	3	5775.1	2848.3	665.0	1027.6		1234.2
4	3	2703.2	1192.3	200.1	884.8		426.0
5	2	1563.4	819.3	140.0	343.1		261.0
6	3	3398.5	1795.1	373.0	988.7		241.7
7	3	3541.2	1733.0	269.8	841.4		697.6
Cohort 1	11	17789.4	8205.5	1979.3	4266.6	101.0	8205.5
Cohort 2	11	11206.3	5539.7	982.9	3058.0		1625.7
Total Observation Time		28995.7	13745.2	2962.2	7324.6	101.0	4862.7

Fig. 3. --Bar graph of the percentage of the total time each physician was observed in four categories of location in rural health centers in Puerto Rico in 1970.

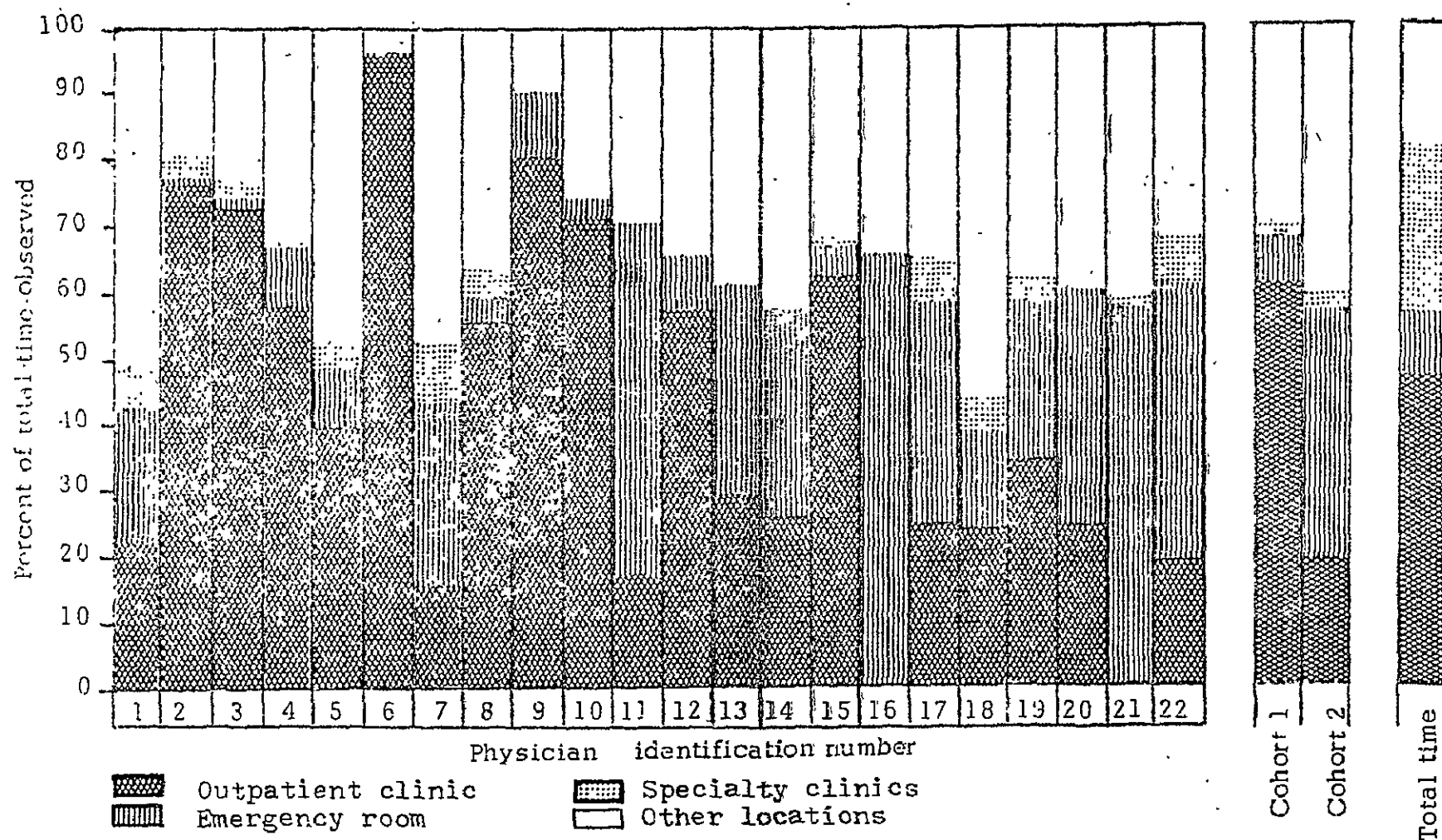


Fig. 4. --Bar graph of the percentage of the total time all physicians were observed in four categories of location in each of seven rural health centers in Puerto Rico in 1970.

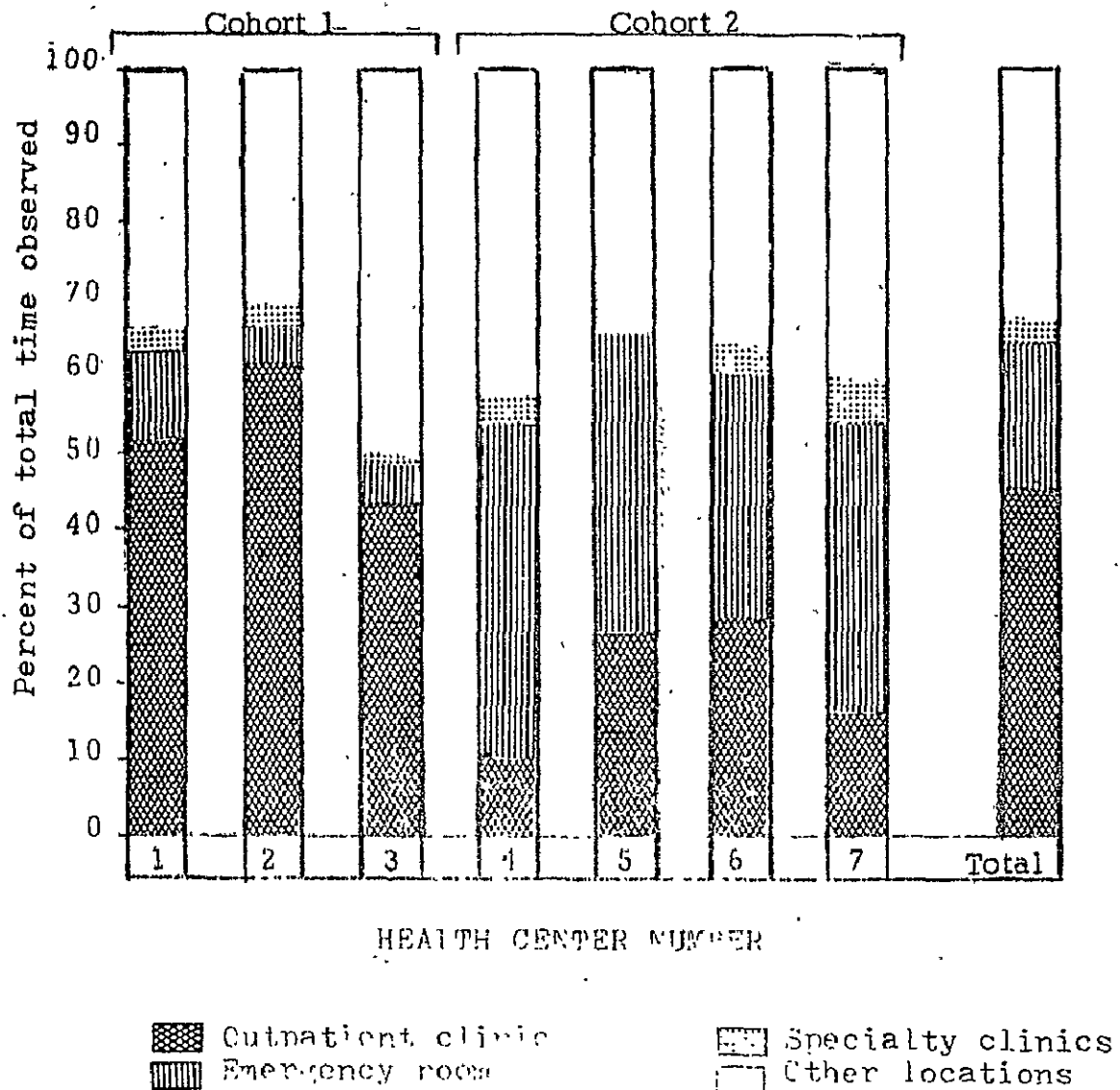




Fig. 5. --Bar graph of the percentage of total time each physician was observed during three periods of the day in rural health centers in Puerto Rico in 1970.

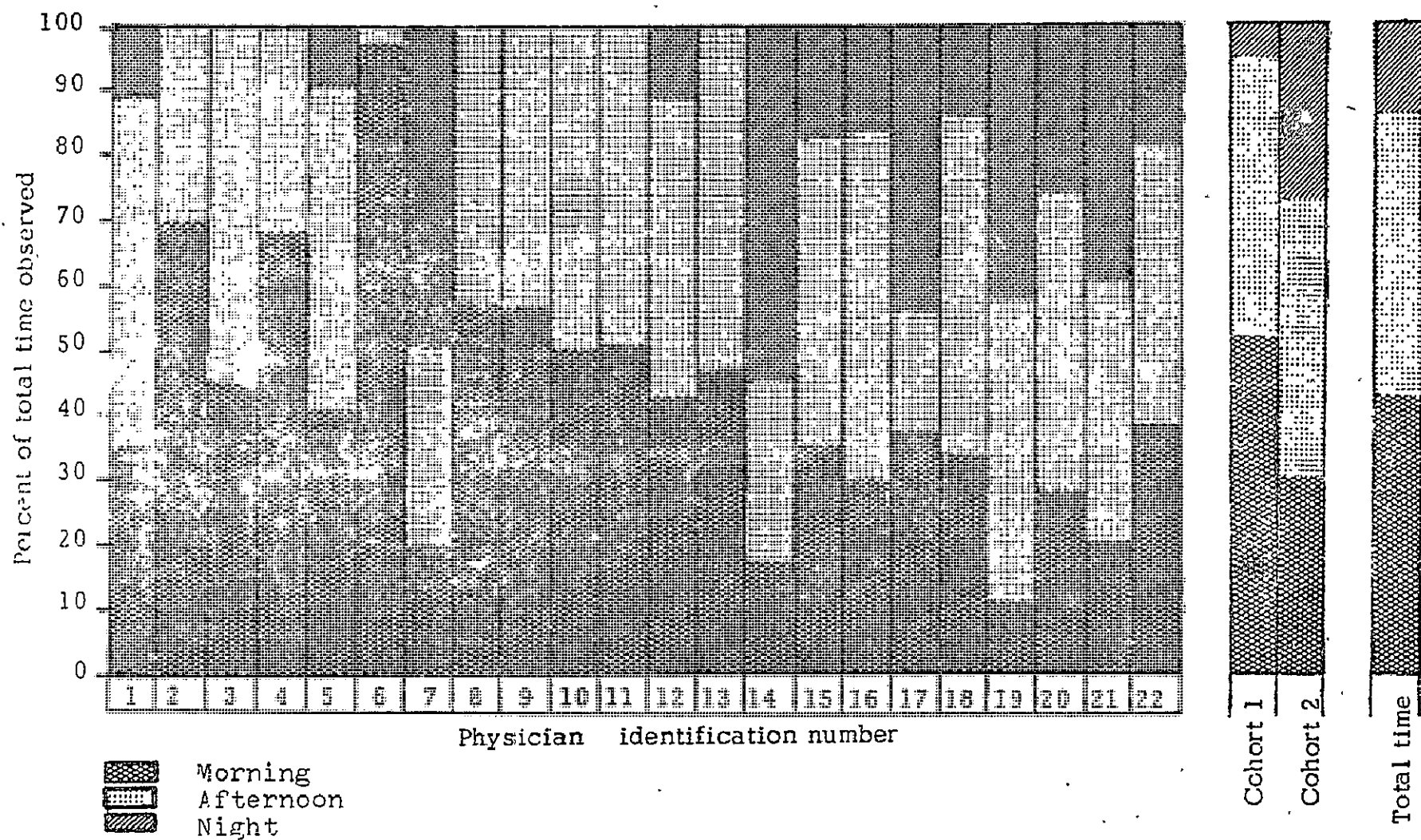


Fig. 6. --Bar graph of the percentage of the total time all physicians were observed during three periods of the day in each of seven rural health centers in Puerto Rico in 1970.

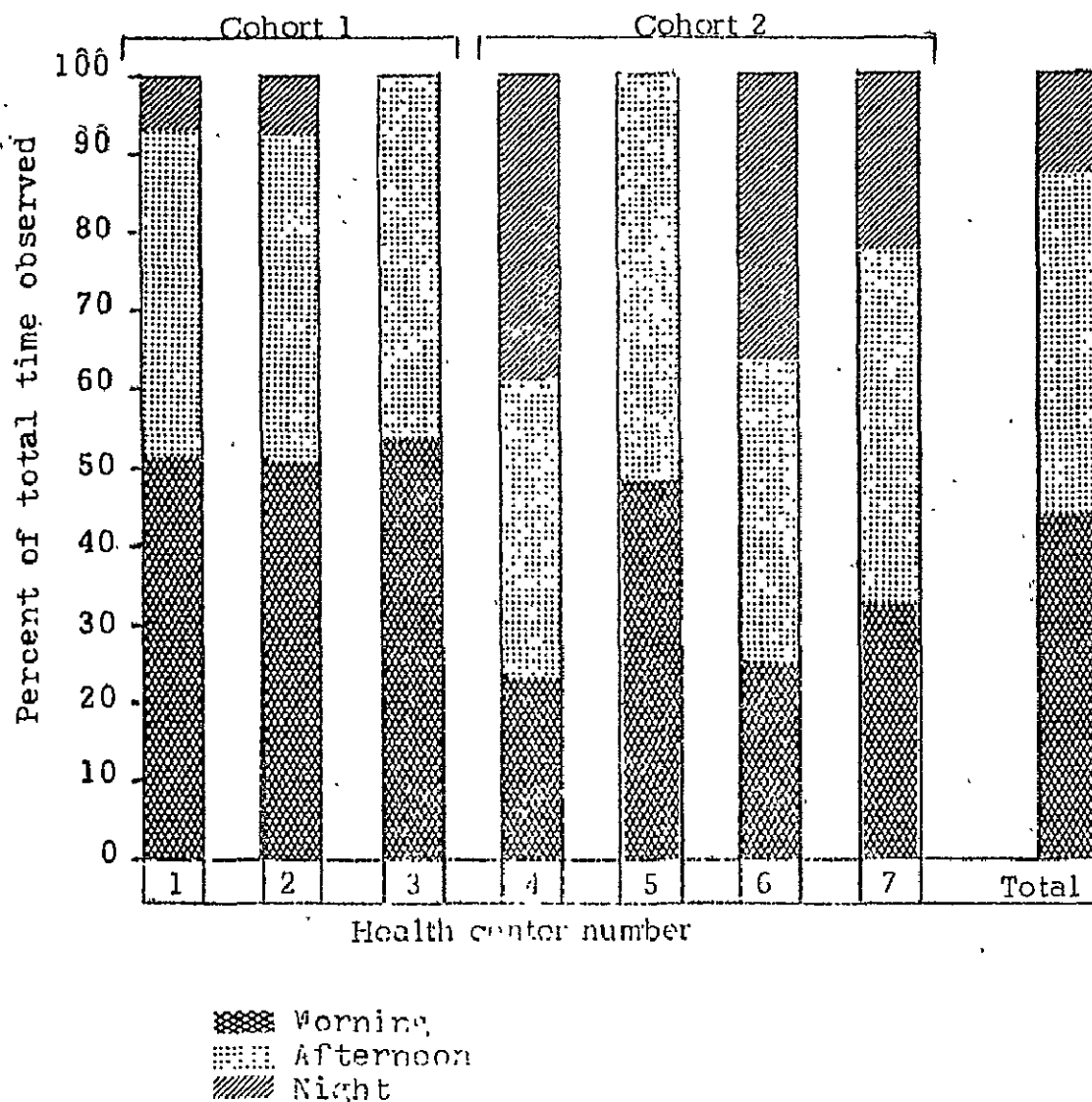


Fig. 7. --Bar graph of the percentage of total time in each of five activities for 22 physicians in rural health centers in Puerto Rico in 1970.

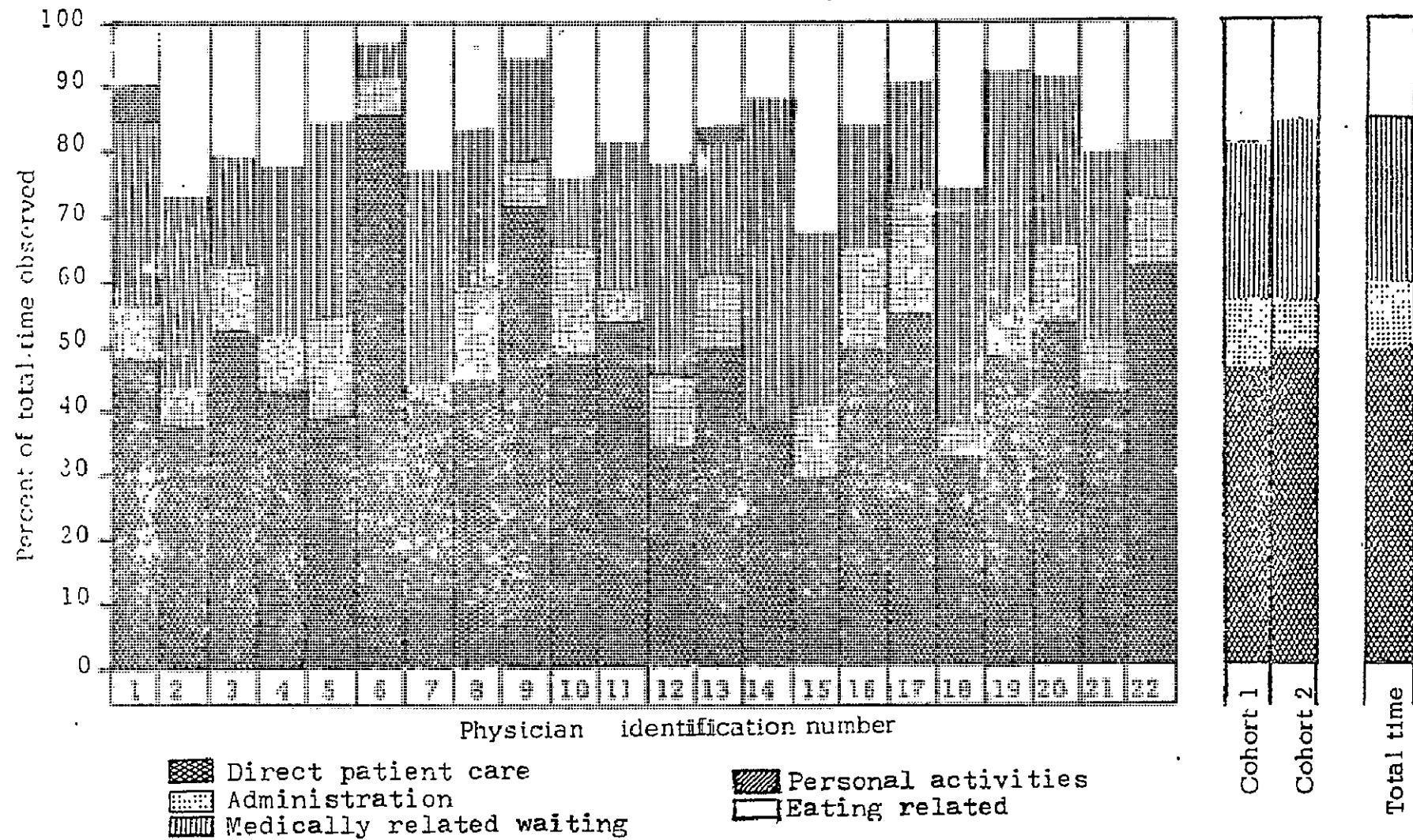


Fig. 8. --Bar graph of the percentage of the total time spent in each of five activities for all physicians in each of seven rural health centers in Puerto Rico in 1970.

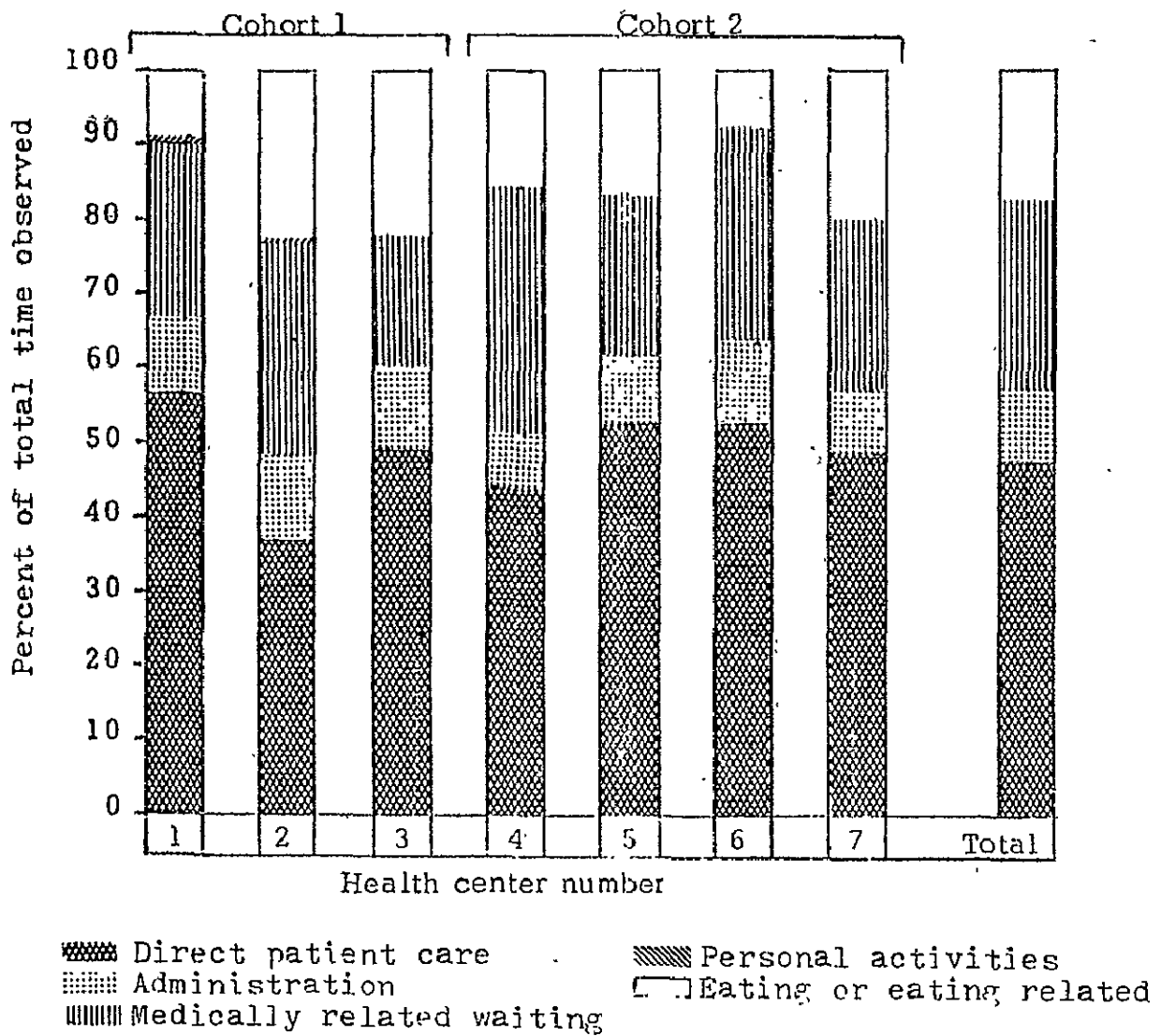
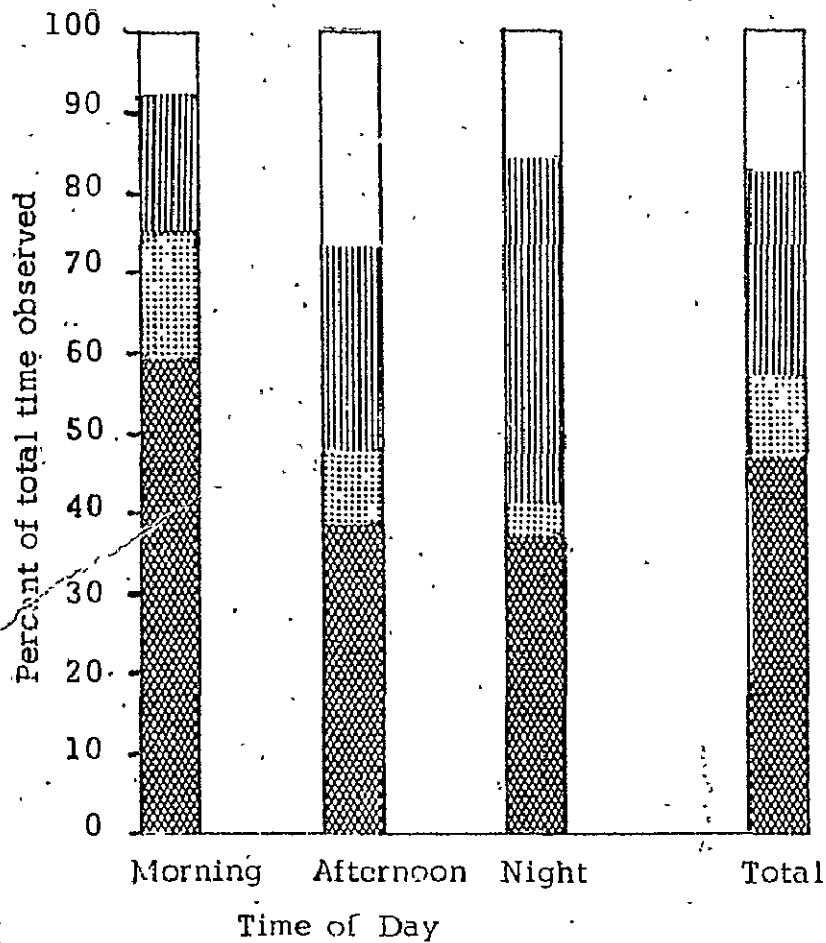


Fig. 9. --Bar graph of the percentage of total time in each of five activities spent by all physicians during three periods of the day in rural health centers in Puerto Rico in 1970.



Direct patient care  
 Administration  
 Medically related waiting  
 Personal activities  
 Eating or eating related

## PHYSICIAN PATIENT CARE ACTIVITIES

In this section the term physician refers only to the twenty-two physicians included in this study. The term patients refers only to those patients who received medical care while the physician was being observed. When the physician ordered medical care by telephone or so directed a nurse not in the presence of the patient, this time was classified as being spent on administration rather than direct patient care.

### Number of Patients

Physicians were observed while they were giving medical care to 3,488 patients. The number of patients per individual physician is presented in Table 5. They saw 2,333 patients in the outpatient clinics and 988 patients in the emergency rooms comprising 3,331 patients, or 95.5% of the total. The emergency rooms and the outpatient clinics were treated as a single category in this section for three reasons: a) except for a greater amount of minor traumatic injuries in the emergency room, the type of patient and patient diagnosis in these two locations was similar; b) in some health centers the physicians saw patients in their outpatient clinic offices, even though they were classified as emergency room patients; furthermore, c) these would be the most logical areas in which lesser trained personnel could be

utilized in treating patients in a health center. One hundred and fifty-seven patients, or 4.5%, were seen in other health center locations, which for presentation of the data in this and the following section, includes specialty clinics.

TABLE 5

NUMBER OF PATIENTS SEEN, AVERAGE PHYSICIAN TIME PER PATIENT, AND STANDARD DEVIATION IN AVERAGE PHYSICIAN TIME PER PATIENT FOR EACH OF TWENTY TWO PHYSICIANS OBSERVED IN RURAL HEALTH CENTERS IN PUERTO RICO IN 1970

Physician's Number	Number of Patients Seen	Time in Minutes	
		Average Time Per Patient	Standard Deviation In Average Time Per Patient
1	184	3.8	4.3
2	167	4.0	2.2
3	262	4.4	2.2
4	264	2.9	2.1
5	126	4.6	2.6
6	192	3.2	3.4
7	115	3.5	2.7
8	184	4.4	7.7
9	293	2.5	1.5
10	266	3.5	2.2
11	100	2.7	2.0
12	198	3.5	2.8
13	108	5.1	4.1
14	102	2.6	1.3
15	217	2.6	2.3
16	102	5.1	4.7
17	102	5.3	5.8
18	101	3.7	2.1
19	101	5.8	3.3
20	100	6.7	7.6
21	104	4.0	3.1
22	100	9.4	7.2

### Patient Characteristics

#### 1. Sex distribution

Female	62%
Male	38%

#### 2. Age distribution

0 - 4 years	19.6%
5 - 14 years	21.8%
15 - 44 years	40.4%
45 - 64 years	11.2%
65+	7.0%

### Patient Diagnoses

The physician's diagnosis of each outpatient and emergency room patient was tabulated according to the List of 70 Causes for Tabulation of Morbidity in the 1965 Revision of the International Classification of Diseases. This compilation is contained in Annex 3. The diagnoses are considered presumptive patient diagnoses because there was no long-term follow-up or other means of confirming the diagnosis in most cases. A listing of the ten most common patient diagnoses seen in the outpatient clinics and emergency rooms of the health centers is presented in Table 6. These ten diagnoses comprised 67.6% of all patients seen.



TABLE 6

THE NUMBER OF PATIENTS OBSERVED  
AND THE AVERAGE PHYSICIAN TIME PER PATIENT FOR THE TEN MOST  
COMMON DIAGNOSTIC CATEGORIES IN THE OUTPATIENT CLINICS AND  
EMERGENCY ROOMS IN SEVEN RURAL HEALTH CENTERS IN PUERTO RICO 1976

Diagnostic Number	Diagnosis	Number of Patients	Percent of Total Patients	Time in Minutes	
				Average Time per Patient	Standard Deviation in Time per Patient
39	Acute Respiratory Infections	690	20.7	2.9	1.7
70	All other Injuries	301	9.0	5.1	5.7
65	Other specified and ill-defined diseases	237	7.1	4.2	3.1
40	Influenza	197	5.9	3.0	3.4
55	Other diseases of the genito-urinary system	156	4.7	3.8	2.7
51	Other diseases of the digestive system	154	4.6	4.1	2.8
03	Enteritis and other diarrheal diseases	147	4.4	3.8	3.0
42	Bronchitis, emphysema and asthma	134	4.0	3.8	2.1
60	Other diseases of the skin and subcutaneous tissue	127	3.8	3.6	3.4
27	Psychoses and non psychotic mental disorders	110	3.3	4.8	4.5
Totals		2253	67.6		

### Physician Time per Patient

The physician time per patient represents that period when the physician was in the actual company of the patient, e.g., from when he first saw the patient until he finished writing a prescription and patient left the office. The average physician time per patient was 3.9 minutes, with a standard deviation of 3.9 minutes, and a range of 0.5 to 60 minutes. The same time of 3.9 minutes was obtained for the mean of the individual physician's average time per patient. The range of the individual physician's average time per patient was from 2.5 to 9.4 minutes.

The average physician time per patient for the outpatient clinic was 3.6 minutes, and for the emergency room it was 4.3 minutes. The average physician time per patient in the outpatient clinics and emergency rooms combined was 3.8 minutes with a standard deviation of 3.3 minutes. The average physician time per patient in other health center locations was 7.1 minutes, with a standard deviation of 10.1 minutes.

The average physician time per patient and the standard deviation in physician time per patient for those with the ten most commonly occurring diseases is shown in Table 6.

### Diagnostic Components of Physician Activities

The five different diagnostic components that were observed to

have taken place before the physician wrote down a patient's diagnosis were (1) medical history, (2) temperature, pulse rate and blood pressure, (3) physical examination, (4) laboratory work and (5) X-ray. These five components are presented as percentages of all patients, of only those patients who were seen in the outpatient clinic and the emergency room, and of those patients seen in the other health center locations.

1) Medical History

	<u>All Patients</u>	<u>Outpatient Clinics and Emergency Rooms</u>	<u>Other Health Center Locations</u>
The study physician spent less than one minute talking with the patient before writing down the diagnosis (0-1 minute)	67.5	69.2	31.2
The physician spent more than a minute but less than five minutes talking with the patient only about the patient's primary complaint (1-5 minutes)	31.1	29.5	65.6
The physician spent more than five minutes talking with the patient directly or indirectly about the patient's primary complaint (>5 minutes)	1.4	1.3	3.2

	All Patients	Outpatient Clinics and Emergency Rooms	Other Health Center Locations
The physician spent more than five minutes talking with the patient and/or the conversation was concerned with other than the patient's primary complaint (0% means less than one patient per 100, not necessarily no patients at all)	0	0	0

2. Temperature, Pulse Rate and Blood Pressure

For 11.2% of all the patients seen, at least one of these measurements was available to the physician before he made the diagnosis. These percentages for all the patients seen in the outpatient clinics and emergency rooms were 9.5%, and 47.1% of all the patients seen in "other health center locations."

3. Physical Examinations

	All Patients	Outpatient Clinics and Emergency Rooms	Other Health Center Locations
No examination performed	24.0	24.3	16.6
Physician performed a minor examination of the affected area only	55.8	57.1	28.0

	All Patients	Outpatient Clinic and Emergency Rooms	Other Health Center Locations
Physician performed a minor examination of the affected area of chief complaint plus an additional area	16.6	15.7	36.3
Physician performed a major examination	3.6	2.9	19.1

#### 4. Laboratory Work

Only 11.2 percent of all patients had laboratory tests ordered by the physician or results of such tests available at the time of examination. This applied to 10.4% of the outpatient clinic and emergency room patients and 25.5% of those patients seen in other health center locations.

#### 5. X-rays of the Patients

An X-ray was either ordered or available to the physician on 2.8% of all the patients seen. This applied to 2.9% of the patients seen in the outpatient clinic or emergency room and 1.6% of those patients seen in other health center locations.

#### Treatment Components of Physician Activities

Four different treatment components of the physicians'

activities were recorded, viz: (1) Procedures, (2) advice, (3) referral for treatment, and (4) medication.

1. Procedures

Treatment procedures were performed on 231 of 3,488 (6.6%) of all patients seen, and 225 of 3,331 (6.7%) of patients seen in outpatient clinics and emergency rooms.

2. Advice

The somewhat subjective determination of the amount of advice given to each patient by the physicians is presented as a percentage of the total patients seen in each category:

	All Patients	Outpatient Clinic and Emergency Rooms	Other Health Center Locations
No advice	2.8	2.5	7.7
Instructions on how to utilize the prescribed medications	55.8	56.7	35.7
Description of the diagnosis and/or treatment more than superficially	40.2	39.5	55.4
Preventive medicine advice	1.2	1.3	1.2

### 3. Referral for Treatment

The five different categories of patient referrals by the physicians are presented as percentages of the total patients seen in each category.

	All Patients	Outpatient Clinic and Emergency Rooms	Other Health Center Locations
Patient was not specifically instructed to seek further medical advice	89.5	89.6	89.2
Patient was advised that he should be seen by the same physician later on in the same day	0.7	0.7	0
Patient was advised to seek follow-up diagnosis and/or treatment from another physician or at another medical facility	7.7	7.5	10.8
Patient was specifically advised to return for additional diagnostic work and/or treatment on a specific date	1.4	1.5	4
Patient was specifically advised to return for additional diagnostic work and/or treatment at some unspecified date if the patient felt it was necessary	0.7	0.7	0

#### 4. Medication

Each of the drugs given to the patients by the study physicians was identified, classified and coded (Annex 2). A total of 355 different drugs was used. The author did not have resources to use a standard individual classification for each drug, such as that employed in the Hospital Formulary of the American Society of Hospital Pharmacists (27). Unfortunately, it was found that the classification used did not allow meaningful comparisons of the drugs with either the patient diagnosis or the judgment determinations.

#### JUDGMENT DETERMINATIONS

The physician and the observer made independent professional judgments on each patient as to whether that patient could have been safely and effectively cared for by one of four categories of medically-trained personnel. The four categories were:

1. A licensed physician
2. A lesser trained individual who could make selected diagnoses and give treatment, including commonly used antibiotics, under the supervision of a physician.



3. A lesser trained individual who could make selected diagnoses and give treatment, not including antibiotics, under the supervision of a physician.
4. A lesser trained individual who could perform nursing and first aid procedures if directed.

For the remainder of this study the individual judgment categories will be referred to by the numbers described above, e.g., 1, 2, 3, 4. A more detailed description of each judgment category may be seen on page 29 (or in Annex I).

The sign test, using the difference in category rank between physician and observer, was the test of significance used. A z-statistic for the normal approximation to the binomial distribution was used to test the hypothesis that there was no systematic difference in ranking between physician and observer. In those cases where they agreed, the judgments were disregarded. The z-statistic used was

$$z = \frac{(x \pm .5) - np}{\sqrt{npq}}$$

testing the null hypothesis that

$$H_0: p = 1/2$$

$$H_A: p \neq 1/2$$

$p$  = probability that the physician rated the patient's care more difficult than the observer.

$q = 1 - p$  = probability that the observer rated the patient's care more difficult than the physician.

$x$  = Number of times the observer thought the patient care more difficult than the physician.

$n$  = Number of judgments which disagreed.

Acceptance of the null hypothesis meant that the observer and physician did not disagree significantly in either direction. The  $p$ -value at the bottom of each table is the probability that a test statistic as large as or larger than the one calculated would occur by chance if the hypothesis was in fact true. If  $p < .05$ , we reject the hypothesis. The sign test analysis indicates that physician number eleven disagrees with the observer and that if the patients he saw are removed from the total data the other twenty-one physicians and the observer agree in their judgments.

These data, although ordinal, are very coarsely grouped on a scale of only four values. The sign test is based on the assumption that the data have an underlying continuous distribution. The coarse grouping of the data make the sign test of doubtful validity in this application. However, the results of the test are not in disagreement with the conclusions which can be drawn from examination of the tables.

TABLE 7

## Physicians Judgments

		1	2	3	4		
Observer Judgments	1	135 3.9	43 1.2	/	/	178 5.1	
	2	76 2.2	1922 55.1	198 5.7	/	2196 62.9	
	3	9 0.3	214 6.1	880 25.2	/	1103 31.6	
	4	/	/	3 0.1	8 0.3	11 0.4	
		220 6.3	2179 62.5	1081 31.0	8 0.3	3488 100.	

All patients.

$$p < .008$$

TABLE 8

## Physicians Judgments

		1	2	3	4		
Observer Judgments	1	106 3.1	38 1.1	/	/	144 4.3	
	2	76 2.3	1855 55.7	190 5.7	/	2121 63.7	
	3	9 0.3	209 6.3	837 25.1	/	1055 31.7	
	4	/	/	3 0.1	8 0.3	11 0.4	
		191 5.7	2102 63.1	1030 30.9	8 0.3	3331 100.	

Outpatient clinic and  
Emergency Room patients.

$$p < .003$$

TABLE 9

## Physicians Judgments

		1	2	3	4		
Observer Judgments	1	29 18.4	5 3.2	/	/	34 21.6	
	2	0 0	67 42.7	8 5.1	/	75 47.8	
	3	0 0	5 3.2	43 27.6	/	48 30.6	
	4	/	/	0 .0	0 .0	0 .0	
		29 18.4	77 49.1	51 32.5	0 .0	157 100.	

Other health center  
locations.

$$p < .03$$

TABLE 10

## Physicians Judgments

		1	2	3	4		
Observer Judgments	1	7 7.0	1 1.0	/	/	8 8.0	
	2	26 26.0	40 40.0	7 7.0	/	73 73.0	
	3	3 3.0	10 10.0	6 6.0	/	19 19.0	
	4	/	/	0 .0	0 .0	0 .0	
		36 36.0	51 51.0	13 13.0	0 .0	100 100.	

Patients seen by  
Physician Number 11.

$$p < .0001$$

TABLE 8

Physician's Expenditures

	1	2	3	4
1	100	1.1	187	100
2	1.1	100	1.1	100
3	187	1.1	100	100
4	100	100	100	100

Physician's Expenditures

p < .05

TABLE 10

Physician's Expenditures

	1	2	3	4
1	100	1.1	187	100
2	1.1	100	1.1	100
3	187	1.1	100	100
4	100	100	100	100

Physician's Expenditures

p < .05

TABLE 7

Physician's Expenditures

	1	2	3	4
1	135	1.1	198	135
2	1.1	100	1.1	100
3	198	1.1	100	100
4	135	100	100	100

All patients

p < .05

TABLE 9

Physician's Expenditures

	1	2	3	4
1	135	1.1	198	135
2	1.1	100	1.1	100
3	198	1.1	100	100
4	135	100	100	100

Other health center

p < .05

TABLE 11

## Physicians Judgments

		1	2	3	4		
Observer Judgments	1	128 3.9	42 1.2	/	/	170 5.1	
	2	50 1.5	1882 55.5	191 5.6	/	2123 62.6	
	3	6 0.2	204 6.0	874 25.8	/	1084 32.0	
	4	/	/	3 0.1	8 0.2	11 0.3	
		184 5.6	2128 62.7	1068 31.5	8 0.2	3388 100.	

All patients except those seen  
by Physician Number 11,

$$.20 < p < .30$$

TABLE 12

## Physicians Judgments

		1	2	3	4		
Observer Judgments	1	99 3.1	37 1.1	/	/	136 4.2	
	2	50 1.5	1815 56.2	183 5.6	/	2048 63.3	
	3	6 0.2	199 6.2	831 25.7	/	1036 32.1	
	4	/	/	3 0.1	8 0.3	11 0.4	
		155 4.8	2051 63.5	1017 31.5	8 0.3	3231 100.	

Outpatient clinic and  
Emergency Room patients,  
except those seen by  
Physician Number 11,

$$.10 < p < .20$$

All physicians and the observer agreed on the judgments

84.5% of the time. Physician Number Eleven disagreed with the observer 47% of the time, and if the 100 patients he saw are removed from the sample, the agreement between the other 21 physicians and the observer is 85.4% of all remaining patients. The corresponding percentages of agreement are similar for the outpatient clinics and the emergency room patients. Physician Number Eleven saw no

patients in other health center locations and the percentage of agreement in the location is 88.5%. In order to remove the bias introduced by physician number eleven the data has been arrayed without "Physician Number Eleven," to illustrate the basic concurrence of medical opinion among the other physicians and the physician-observer.

The judgment determinations for the physician and this observer are presented in four-by-four table form. The number of patients and the percentage of the total patients seen in each health center location are displayed in each block of the Tables.

The percentages of patients, inclusive of physician number eleven's, who in the judgment of the physicians and the physician-observer could be safely and effectively cared for by each category of trained individual is presented as follows:

Category	All Patients	Outpatient Clinic and Emergency Room	Other Health Center Locations
1	5	4	21
2	63	64	21
3	31	31	31
4	1	1	0

Stated in another way, the judgment was that a physician level of training was required to care safely and effectively for 4% of the patients seen in the emergency room and outpatient clinic and for 5% of all patients seen in the health centers. Twenty-one percent of those patients seen in "other health center locations" (surgery room, delivery room, specialty clinics, and the hospital section of the health center) were judged to require a physician level of training.

#### By Patient Diagnosis

The percentage of the total patients in each diagnostic category in which either the physician or the observer judged a category 1 individual is presented in Annex 2. It is noted that 251 patients were referred to other medical facilities for additional diagnostic or treatment work. These patients were often given only a completed referral form by the physician and even though a rather complex provisional diagnosis may have been recorded, the judgment determination may have been 2 or 3.




TABLE 13

Physicians' Judgments

		1	2	3	4		
Observer Judgments	1	3 .4	1 .1			4 .5	
	2	5 .7	488 70.8	30 4.3		523 75.8	
	3	0 .0	18 2.6	145 21.1		163 23.7	
	4			0 .0	0 .0	0 .0	
		8 1.1	507 73.5	175 25.4	0 .0	690 100.	

39. Upper respiratory infection

TABLE 14

Physicians' Judgments

		1	2	3	4		
Observer Judgments	1	1 .5	0 .0			1 .5	
	2	0 .0	104 52.8	12 6.1		116 58.9	
	3	0 .0	12 6.1	68 34.5		80 40.6	
	4			0 .0	0 .0	0 .0	
		1 .5	116 58.9	80 40.6	0 .0	197 100.	

40. Influenza

Four-by-four tables of two commonly occurring diagnostic categories are presented to illustrate the variations of judgments within the diagnostic categories. Four-by-four tables of the eight other most common diagnoses are arrayed in Annex 4.



By Time

The average times per patient within each judgment category for those patients on whom the physician and observer were in agreement are presented in Table 15.

TABLE 15

THE AVERAGE PHYSICIAN TIME PER PATIENT AND THE STANDARD DEVIATION IN AVERAGE PHYSICIAN TIME PER PATIENT IN EACH OF FOUR JUDGMENT CATEGORIES IN THREE DIFFERENT LOCATIONS OF SEVEN RURAL HEALTH CENTERS IN PUERTO RICO IN 1970.

Judgment Category	Time in Minutes					
	All Patients		Outpatient Clinic and Emergency Room		Other Health Center Locations	
	Average	Standard Deviation	Average	Standard Deviation	Average	Standard Deviation
1	8.5	8.1	7.7	5.8	11.4	13.1
2	4.1	4.1	4.0	3.5	7.6	12.0
3	2.9	1.8	2.9	1.8	4.0	1.9
4	2.6	1.1	1.6	1.1	No Patients	No Patients

## DISCUSSION

The results from this study of physicians in rural Puerto Rican Health Centers provide documentation of physician activities and offer professional opinions concerning the possible use of "lesser trained individuals" to provide medical care. In the ensuing discussion an attempt will be made to consider some of the more important background data and interpretations of the results of the physician utilization in these rural health centers.

The continuous direct observation of the physicians' activities by an observer-physician was an accurate method of recording activities. The observer made a preliminary visit to each health center prior to actually beginning the observations. The purpose of this initial visit was to establish rapport with health center personnel, fully explain the objectives of the study and optimally coordinate the observation time schedule with clinic activities. It is the author's opinion that the study physicians did not radically alter their normal working habits during the periods of observation. Three instrumental factors which helped normalize physician-to-physician acceptance of the observer were:

- a. The observer's status as a graduate student from the United States; this was much less threatening than

the presence of an employee of the Puerto Rican Department of Health would have been.

- b. The assurance that the study physicians' names would be kept anonymous when presenting the results.
- c. The informal and formal endorsements of the study by the Northeast Regional Health Office and the School of Public Health of the University of Puerto Rico.

In reviewing the characteristics of the twenty-two physicians in this study, sixteen had provisional medical licenses which did not allow them to maintain a private practice, and only three of the physicians lived in the municipality or county where they worked. These factors directly or indirectly tend to support the premise that physicians would rather practice in urban areas than in rural health centers. The difficulty in obtaining physicians for rural health centers is documented in the Annual Report for the Northeast Health Region, 1969 (24). It is interesting to note that ten of the study physicians were natives of Puerto Rico, yet none was a graduate of the University of Puerto Rico Medical School.

#### PHYSICIAN UTILIZATION

The information concerning the location and the time of day of each physician's activity as well as location and time in each

health center were presented in order to show where and when the observations were carried out. Due to the different work assignments within the health center and the difference in working habits of each physician, it was not possible to standardize the amount of observation time for each physician in each location during the study. This was also true in respect to standardization of observations during different periods of the day. The composite observations provide representative samples of observations in each location and in each of the three periods of the day.

There was a large variation between the individual physician's activities observed in the health centers, but when the activities within each health center of all physicians were combined there was much less variation in the amount of time spent in each activity. This would seem to indicate that the similar overall service responsibility of each health center requires a similar amount of physician time in each activity. This also supports the observation that one of the factors responsible for the variation in individual physician's activities is their difference in assignments within the health centers.

Since observation of each physician's activities varied so widely as to location and time of day, it was considered important that the composite cohort percentage or the total observation times be used in developing any generalizations.

The presentation of the composite physicians' activities during different times of the day was also considered relevant. Most of the night observations were carried out between 5:00 and 10:00 p.m.

The composite physician activities during the night indicate that about 45% of their time was spent in medically-related waiting versus the afternoon figure of 25% and the morning figure of 18%.

Most of the patients seen in the emergency room at night were not emergency patients but individuals who worked during the day and came to the emergency room at night for routine medical care. Many physicians were disturbed by this practice, and this attitude, when conveyed to the patients, resulted in ill feelings. This high percentage of medically-related waiting time by physicians on night duty and the obvious desire of many patients for medical care at night would seem to suggest the desirability of establishing a normal outpatient clinic during this period rather than the somewhat attenuated services offered in the emergency rooms.

Comparable studies of physician activities in rural health centers are not available. Although the World Health Organization's studies in Taiwan and Malaysia should have comparable data, they are not available. Physician activity studies conducted in urban hospitals do not parallel this study and other studies in rural settings, and the classification of activities in the various studies of physicians are all different.

In the research by Y. T. Yen, et al. (10), which was completed in rural health stations of Taiwan, it was found that clinical work accounted for 35% of the physicians' time, and 49% of their time was spent in personal affairs. In the present study, 66.4% of the physicians' time in the health center was spent in clinics, although only 44.7% of the time was spent in direct patient care. In addition, 42.3% of the physicians' time in the seven Puerto Rican health centers was spent in medically-related waiting or eating-related activities; this figure may be comparable with the 49% personal time in the Taiwan study. Office work was found to account for 6% of the time in the Taiwan study, and "administration," which seemed the most comparable category in this Puerto Rican study, accounted for 10.2% of the physicians' time.

The time and motion study by Bergman, et al. (9), involved practicing urban pediatricians. In their study approximately 50% of the physicians' time was spent in contact with patients, which compares closely with the 47% of time spent in direct patient care in the present study. If telephone and paper work were combined to form about 20% of the physicians' activities in the Bergman study, this compares with 10.2% administration time in this study which included these tasks.

In summary, this study showed that in the seven Puerto Rican health centers, 47.4% of the physicians' time was spent in direct patient care, a figure which compares favorably with similar studies described in the literature.

### The Physicians' Patient Care Activities

The overall age and sex characteristics of the patients are presented to give base line data of the patients. The age distribution of the patients reflects the comprehensive objective of the health center in each municipality. This distribution indicates that the health center is indeed serving all age groups of the population.

While in this study it was found that the average time each physician spent in the health center during the day was five hours, there was great variation in the total amount of time spent there by each physician. Furthermore, physicians' night duty was not taken into consideration in this figure. The average time of 3.9 minutes spent with a physician for all patients is not considered unusual for a government-operated rural health center. However, this brevity imposes limitations on the type of physicians' activities that can be carried out with each patient. The fact that most of the physicians commuted from a metropolitan area to their health center may have contributed to frequent late arrivals and early departures. As a result, there were usually many patients waiting when the physicians arrived and they tended to be seen on an assembly-line basis.

Normally, the patient would enter the physician's office, sit down, and briefly describe a chief complaint. The attending physician usually asked a few questions and then briefly examined the area of chief complaint. Although medical records were kept there was usually

(90%) no record with the patient in the emergency room or the outpatient clinic and the physician simply wrote out a prescription for the patient. There may or may not have been further discussion, and the patient left the office with the next patient entering immediately. The total amount of time the patient spent with the physician averaged 3.9 minutes.

#### Diagnostic Components of Physicians' Activities

The patient diagnoses recorded by the physicians were presumptive in nature and there was no provision to record multiple diagnoses. For this reason any considerations of the patients' diagnoses must be made with caution. The average time per patient in each diagnostic category changed significantly with the different types of diagnoses and was longer for those categories which are considered more difficult to diagnose and treat, e.g., acute respiratory infection 2.9 minutes, and hypertensive disease, 5.1 minutes.

The results of diagnostic activities by the physicians generally indicated that less time was spent on diagnosis per patient in the outpatient clinic and emergency rooms than in other health center locations. This would be expected since the more difficult medical cases are seen in the other health center locations (e.g., surgery and delivery rooms, specialty clinics, and hospitalized patients). This is dramatically apparent in the results concerning the average time per patient that the physicians spent in obtaining a medical history. With 69.2% of the



patients in the outpatient clinics and emergency rooms the physician spent less than one minute on the medical history, and more than one minute for 30.8% of the patients. The figures are reversed in other health center locations with the physicians using less than one minute in 31.2% of the cases.

The short average time per patient is reflected in the small percentage (4.5%) of patients seen in other locations in which the more complicated and time-consuming diagnostic procedures were carried out.

The small percentages of laboratory and X-ray procedures may be partially explained in that these facilities were not operating in many of the health centers, and patients had to be referred to other medical facilities for the tests. X-ray machines had not been installed in many of the health centers, and the registered laboratory technician required by regulation was not available to operate many of the laboratories. Of the laboratory tests that were ordered, most involved a hemoglobin determination combined with a stool examination for ova and parasites in children, or a urinalysis in adults. The X-ray examinations were primarily to rule out fractures resulting from trauma. Patients requiring more than superficial diagnostic work-ups were usually referred to the regional hospital.

### Treatment Components of Physicians' Activities

It is unfortunate that circumstances did not allow effective analysis of the information obtained in respect to the drugs prescribed in the treatment of each patient. There were several factors which contributed to this:

1. The study instrument lacked the capability for recording multiple diagnoses. This resulted in situations where a drug was prescribed for a secondary diagnosis, and there was no apparent need for its use in relation to the primary diagnosis, e.g., Insulin for an upper respiratory infection.
2. In some cases a physician prescribed a drug that was considered less appropriate for the diagnosis because the health center pharmacy was out of stock of a more suitable drug, e.g., streptomycin instead of erythromycin for an upper respiratory infection.
3. The physicians used a wide spectrum of drugs, and the author was unable to classify them in such a way as to allow coding and analysis within the limits of computer time and other resources available.

The treatment procedures used were almost all suturing lacerations, removing sutures, or incisions and drainage of abscesses. These measures were usually performed in the emergency room after the nurses had prepared the patients and the equipment.

The subjective measurement of the amount of treatment advice given each patient by the physician was dictated by the short average time per patient. No advice or only minimal advice concerning instructions on how to utilize the prescribed medications was given to 59% of the patients seen in the emergency rooms, e.g., "take this medicine three times a day." Preventive medicine advice was given to only 1.2% of the patients seen. This is another example of the constraints imposed by the limited amount of time per patient.

The patients who were referred to other medical facilities for follow-up diagnosis and for treatment represented 7.7% of all patients seen in the health centers. Many of these were referred for laboratory or X-ray procedures. Those patients referred because of the need for more sophisticated medical care were often the most interesting and hence challenging for the health center physicians. The physicians stated that they often had no further responsibilities or follow-ups with these patients. These circumstances resulted in the physicians not using the medical training they had received to its fullest and increased their frustrations with work in the rural health centers.

## JUDGMENT DETERMINATIONS

The four judgment categories used in this study were developed on a functional basis rather than to comply with specific training program definitions. Many training programs are currently being developed in the United States to train various types of mid-level health manpower (28). The Department of Health, Education, and Welfare listed 125 such programs in March 1971 (29). Furthermore, many areas of the world have employed non-physicians to deliver medical care for many years (30) (31) (32) (33). The levels of responsibility and capability of these auxiliary personnel are diverse, especially in newly-developing programs in the United States. There have been several different nomenclatures and classifications proposed for the various types of auxiliary personnel. None of the proposals have been accepted by all interested parties and use of one would have tended to exclude application of the present findings to the others. For this reason a functional definition of the various judgment categories was developed to address the area of the "physician bottleneck" in patient care.

When the busy physician is required to see every patient, no amount of medical support personnel can effectively increase his time

with individual patients. In this study the judgment covered the total patient care activity performed by the physician on each patient. If the patient was judged by consensus of the physician and observer to be within a category 2, 3, or 4 individual's capability, it would not have been necessary for him to see a physician.

The judgment categories 2 and 3 would be more applicable to a generalist type of mid-level individual such as a Medex (34) or a specialist with broad responsibilities, such as a Child Health Associate (35). Those types of auxiliary medical personnel which could not make supervised diagnostic and treatment decisions and could only carry out the directives of a physician would be placed in category 4. Categories 2 and 3 are differentiated primarily on the ability to prescribe common antibiotics. This was done in an effort to emphasize the importance of this capability as well as allowing the results to be applicable where state laws allow only physicians to prescribe antibiotics.

The average time per patient in each judgment category supports the validity of the physicians' judgment determinations indirectly. The average time per patient was longer for category 1 patients (which was the most advanced patient care category) and progressively shorter for categories 2, 3, and 4.

The judgments were made on actual patients immediately after they received medical care. Hence health center physicians' judgments

were considered more important since they were directly responsible for the patients' medical care. However, the observer's judgment on each patient represented the same person's judgment on every patient and provided a common standard to which the twenty-two different health center physicians' judgments could be compared.

The judgments of the health center physicians and the observer were not significantly different except for Physician Number Eleven, who disagreed with the observer 47% of the time. This consistency is remarkable when one considers the diversity of their backgrounds and individual variations in their working habits and areas. In view of the individualistic nature of physicians it was not considered unusual to find one who disagreed with the other twenty-one concerning the delegation of medical care activities.

This study indicates that in the opinion of the health center physicians and the observer, 63% of the patients could have been safely and effectively cared for by a category 2 individual, and 31% by a category 3 individual. However, it also shows that provisional diagnosis alone is not an adequate way of determining the category of individual to deliver care. There were patients in every diagnostic classification who were judged to need different categories of individuals to deliver medical care. Although the physicians concurred that there were patients in some diagnostic classifications who could

usually be cared for by a category 2 or 3 individual, there were always exceptions when a category 1 individual was deemed necessary. This emphasizes the desirability of providing consultative and referral support for lesser-trained medical individuals in their working environment.

#### CLOSING COMMENT

This study has dealt only with rural health center physicians' activities and their judgments concerning the delegation of medical care to lesser-trained individuals. It did not cover patients' attitudes, economics, or political parameters which are essential in the consideration of any health delivery system.

### CONCLUSIONS

The conclusions from this study are concerned with the work of physicians in rural health centers in Puerto Rico.

1. A composite analysis of the time physicians spent in the health centers indicated that 42% of their time was devoted to medically-related waiting or eating-related activities. While there was variation among the individual physician's activities, it seems that a large portion of this time could have been utilized more productively in medical work.
2. The average visit time per patient for all patients seen was 3.9 minutes. This brief time severely limited the amount of diagnostic and treatment activity physicians could perform with each patient. Concomitantly the physicians had little chance to practice fully the skills they had learned or developed in training, or to become effectively involved with patients' problems.



3. The physicians collectively judged that only 5% of the patients they cared for required a physician's level of training. They considered that 95% of the patients could have been safely and effectively cared for by a lesser-trained individual who could prescribe common antibiotics and 32% of the patients if the individual could not prescribe antibiotics.

It is concluded, from a medical standpoint, that the care of a large portion of these patients could be safely and effectively delegated to lesser-trained individuals.

4. Direct observation by a non-threatening observer-physician was an accurate way of measuring physicians' activities and judgments.

### RECOMMENDATIONS

This study has dealt only with physicians, and it would be useful to carry out a similar study in an area where lesser trained individuals are being utilized to deliver medical care. Information could be collected on the patient care activities of these personnel, and such a study would allow comparison of the physicians' working activities with, and without, the help of lesser trained individuals. This type of study could also compare the cost of medical care with or without the help of lesser trained individuals. If financial savings could be realized it is possible that these savings could be utilized to expand or improve the health system in other ways. In those areas where patients are accustomed to physicians only giving medical care it would be necessary to evaluate the patients' acceptance of other health personnel.

It is thought that such a comparative study or studies would be particularly valuable if conducted in Latin American countries with comparable health delivery problems and economic situations which would make it appropriate to develop and utilize lesser trained medical individuals.

The present study did not deal with identification of

individual tasks that lesser trained personnel could perform. A study to identify more closely these individual tasks, such as taking a history, performing a physical examination, prescribing selected medications, etc., would be desirable for the development of training programs for such personnel.

This study determined that physicians delivering health care in rural areas judge that lesser trained individuals could be utilized to deliver medical care. This information could well be considered by those policy makers and administrators who must take into account many political, economic and social variables when they are designing or modifying a health care delivery system.

SUMMARY

A shortage or total absence of physicians exists in most rural areas of the world. It is recognized that ideal staffing patterns for rural health centers are unattainable when utilizing the traditional physician roles. It would appear that the role of physicians in health services could be redefined in order to provide more efficient and effective health programs for rural communities.

The three objectives of this study were; 1) to determine how twenty-two selected physicians utilized their on-duty time in seven rural health centers in the Northeast Health Region of Puerto Rico; 2) to determine what type of patient-care activities were performed by these physicians; and 3) to determine the physician's judgment for each patient seen as to whether the patient could be safely and efficiently cared for by a lesser-trained individual. It was hoped that these findings could contribute to a redefinition of the physician's role and allow lesser-trained individuals to deliver medical care.

The method used for collecting data involved a physician-observer accompanying each physician and recording observations of his activities. Immediately upon completing the care of each patient the observer and the study physician independently made judgments as to whether a physician or a lesser-trained person could have safely and effectively diagnosed and treated the patient.

The study observations were made between December 2, 1970, and September 20, 1971.

The health center physicians' activities were observed for a combined total of 28,995.7 minutes (483  $\frac{1}{4}$  hours) and concerned observations of medical care given to a total of 3,488 individual patients. Ninety-five percent of the total patients were seen in outpatient clinics and the emergency rooms and 4.5% were seen in other health center locations.

The average distribution of time for all physicians' activities was: 1) direct patient care, 47.4%, 2) administration, 10.2%, 3) medically-related waiting time, 25.3%, 4) personnel, 0.3%, and 5) eating-related time, 16.8%. The average time each patient visited a physician was 3.9 minutes.

The physicians collectively judged that only 5% of the patients they cared for required a physician's level of training, and considered 95% of the patients could have been safely and effectively cared for by a lesser-trained individual who could prescribe common antibiotics, and 32% if the individual could not prescribe antibiotics.

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## Biographical Data

**Name:** Gerold Victor van der Vlugt

**Address:** 2824 Metairie Heights Avenue  
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Telephone: (504) 833-5164

**Birth:** 13 May, 1939, Portland, Oregon, U.S.A.

**Marital Status:** Wife, Theresa, M.D.; two children

Education:

Lewis and Clark College September 1956-May 1960; B.S.-Chemistry and Biology.  
University of Oregon Medical School, September 1959-June 1963; M.D.  
Los Angeles County General Hospital Internship; July 1963-June 1964.  
Tulane School of Public Health and Tropical Medicine, September 1968-June 1969;  
M.P.H. and T.M.

Professional Background:

July 1964-September 1964: Private practice in John Day, Oregon.

September 1964-July 1968: Various assignments as Medical Officer, U.S. Coast Guard, including development of facility at Governors Island, N.Y.

July 1968-present: Training status as Commissioned Officer (O-5) in U.S. Public Health Service, Global Community Health Career Development Program. Training includes completion of General Preventive Medicine Residency in International Health Administration and a Doctor of Public Health thesis on "Utilization of Physicians in Selected Rural Health Centers in Puerto Rico."

June 1969-September 1969: Studied work of World Health Organization in Jamaica and conducted preliminary field studies in Puerto Rico for research leading to a Doctorate of Public Health.

September 1969-December 1969: Participant-observer with Louisiana Family Planning, Inc., developing statewide family planning clinics.

January 1970-July 1970: U.S.A.I.D. Preceptorship in Viet Nam; Preventive Medicine advisory responsibility throughout Delta Region

July 1970-September 1970: Studied family planning, rural health problems in Malaysia, Thailand, Taiwan and Korea through W.H.O. coordinated visits.

October 1970-present: Doctor of Public Health field studies in Puerto Rico, thesis preparation at Tulane University.

Career Objective:

Assignments in International Health Administration at the discretion of the U.S. government.

ANNEX 1

## STUDY INSTRUMENT

[illegible]

EXPLANATION OF STUDY INSTRUMENT

DATE (1,2,3,4,5,6)

Day = 1 & 2

Month = 3 & 4

Year = 5 & 6

PHYSICIAN IDENTIFICATION (7,8)

Confidential Code

TIME (13,14,15)

Recorded by on-scene observer  
using a stop watch, in minutes  
and 1/10 minutes.

ACTIVITY (16)

Coded

1. Direct patient care, i.e., Hx, P.E.,  
Dx, Rx, or supervision of other personnel.
2. Medical Administration
3. Medically "Related" Travel or Waiting  
Time.
4. Non-Medically Related or Wasted Time.
5. Lunch or coffee break.

LOCATION (17)

Coded

1. General OPC or Dispensary
2. Emergency Room
3. In-patient or Hospital Care
4. Specialty Clinic
5. Surgery or Delivery Rooms
6. Health Center - Other
7. Outside Health Center

JUDGEMENT SECTION (18,19,20, 21)

Coded and Weighted

This section is provided for the physician and the observer to record a weighted determination of whether a physician or lesser trained person is required to perform the activity. The observer and the physician will record their determinations separately and space is left to record other independent judgements. The preliminary code is presented as follows:

1. Activity should be performed by a physician.
2. Activity could be safely and effectively performed by a lesser trained person who can:
  - a. Take histories and conduct physical examinations on patients and make supervised medical decisions.
  - b. Prescribe commonly used antibiotics only e.g. - penicillin, tetracyclines, Erythromycin.
  - c. Prescribe other selected items such as topical applications, non-narcotic cough medicines, anti-pruritics, selected antihelminthics, immunizations.
  - d. Suture minor lacerations and treat minor injuries.
  - e. Perform selected laboratory, nursing and procedural activities.
  - f. Give preventive medical advice and selected referrals.
3. Activity could be safely and effectively performed by a lesser trained person who can:



- a. Conduct limited histories and physical examinations on patients and make limited medical decisions.
- b. Prescribe selected non-antibiotic items and non-prescription drugs such as ASA, topical applications, available drugstore or home treatments, antipruritics, immunizations.
- c. Treat minor injuries not requiring sutures, x-ray or laboratory work.
- d. Perform selected laboratory, nursing and procedural activities.
- e. Give preventive medicine advice.

4. Activity could be safely and effectively performed by a lesser trained person who can:

- a. Perform first aid and directed procedures about the Health Center.

PATIENT I.D. (IDENTIFICATION)

NUMBER (22,23,24)

I through X in chronological order for each physician observed or correlated with patient log of clinic.

AGE (25,26)

Coded

1 = 0-4 Years

2 = 5-14 Years

3 = 15-44 Years

4 = 45-64 Years

5 = 65 + Years

## SEX (27)

1) = Male      2) = Female

## TYPE OF PATIENT VISIT (28)

Coded

1.

Previous medical record not available to physician at the time he sees the patient.

2.

Previous medical record not in physicians possession at the time he sees the patient but physician is familiar with patient and his present medical complaints from previous visits.

3.

Previous medical record available to physician at the time he sees the patient.

4.

Primary diagnosis previously established in medical record available to physician at the time he sees patient.

DIAGNOSTIC PROCEDURES

## HISTORY (29)

Coded

1.

Less than 1 minute.

2.

Less than 5 minutes - concerned only with patients primary complaint.

3.

More than 5 minutes - concerned directly or indirectly with patients primary complaint.

4.

More than 5 minutes and/or concerned with other than the patients primary complaint.

## TEMPERATURE, PULSE, AND BLOOD PRESSURE (30) Coded

- 0. None
- 1. Temperature only
- 2. Pulse only
- 3. Blood pressure only
- 4. Temperature and pulse only.
- 5. Blood pressure plus temperature or pulse.
- 6. Blood pressure, temperature and pulse.

## PHYSICAL EXAMINATION (31) Coded

- 0. No examination
- 1. Minor examination - affected area only -  
patient not required to remove clothing,  
e.g., EENT, Palpation or an extremity,  
Auscultation through clothing.
- 2. Minor examination - affected area included.
- 3. Major examination - patient required to  
remove clothing, multiple areas examined  
and/or greater than 5 minutes duration.

LABORATORY EXAMINATION (32) Coded. Ordered or performed by the  
physicians.

Results available prior to treatment of patient.

- 0. None
- 1. Blood CBC - Hb, Hct, Diff, WBC, Sed Rate.
- 2. Urine = Routine U.A. = Micro., Prot., Sug.,  
Sp.Gr., PH.

3. Stool for Ova and Parasites.

4. Other

Examination ordered but results not available prior to treatment of patient.

5. Blood - GBC - Hb., Hct., Diff., WBC,  
Sed. Rate.

6. Urine - Routine U.A. = Micro., Prot.,  
Sug., Sp.Gr., PH.

7. Stool for Ova and Parasites.

8. Other

#### X-RAY (33)

Coded

Ordered or performed by physicians.

0. None

1. Results not available prior to treatment  
and release of patient.

2. Results available prior to treatment and  
release of patient.

3. Preventive Medicine or Survey X-Ray not  
indicated for primary complaints of the  
patient.

4. Referred to another facility for X-Ray.

#### WRITTEN DIAGNOSIS

As recorded by examining physician, to be coded later.

#### DIAGNOSTIC CODE (34,35,36,37,38)

A numerical diagnostic code to be developed from the diagnoses established,

by the treating physician, which will correlate with existing Puerto Rican diagnostic classifications:

## TREATMENT CODES (39,40,41)

(Example Only)

## Prescription Medications

- |    |  |
|----|--|
| 0. | None   |
| 1. | Prescription Antihistamines and Non<br>Narcotic cough medications. |
| 2. | Tetracycline, Erythromycine, Sulfas.                               |
| 3. | Penicillin - Oral  |
| 4. | Injectable Penicillin  |
| 5. | Injectable Iron or Vitamines                                       |
| 6. | Topical Applications - Antibiotic and other                        |
| 7. | Anthelminthics   |
| 8. | Other  |

## NON-PRESCRIPTION MEDICATIONS (42)

Coded

- |    |       |
|----|-------|
| 0. | = No  |
| 1. | = Yes |

## PROCEDURES (43)

Coded

- |    |   |
|----|---|
| 0. | None  |
| 1. | I. and D.   |
| 2. | Suture Removal  |
| 3. | Minor Suturing - No significant arterial<br>or nerve damage apparent. |

4. Major Suturing -- Significant arterial nerve, or tendon damage; requiring more than 30 sutures; or judged particularly difficult.
5. Dressing change.
6. Lumbar Puncture.
7. I.V. Start
8. N.G. Tube
9. Other

#### VERBAL (44)

1. Coded
1. Minimal, liaison and reassurance established with patient.
2. Treatment instructions given only.
3. Description of diagnosis of treatment more than superficially.
4. Preventive Medicine advice given.

#### REFERRAL (45)

0. Coded
0. None.
1. For additional follow-up on the same day by same physician.
2. For additional follow-up of primary complaint with another physician or facility.

3.

For future return and additional medical evaluation on a specific date.

4.

For return and additional medical evaluations at some unspecified time in the future.

**COMMENTS**

For appropriate notes by observing physician.

ANNEX 2



DRUG LIST AND CLASSIFICATION

## CODE CLASSIFICATION OF DRUGS BY AMA DRUG EVALUATIONS (26)

## 01 ANTIACIDS

1. Creamalin
2. Gelusil
3. Mylanta
4. Oxaine
5. Maalox
6. Delcid

## 02 ANTIANGINAL AGENTS

1. Crespan
2. Peritrate
3. Nitroglycerin

## 03 ANTIANXIETY AGENTS--ANTIPSYCHOTIC

1. Librium
2. Sinequan
3. Valium
4. Stelazine
5. Mellaril

## 04 ANTICOAGULANTS

## 05 ANTICONVULSANTS

1. Dilantin
2. Epamine

## 06 ANTIDEPRESSANTS

1. Tofranil

## 07 ANTIDIABETIC AGENTS

1. DBI
2. Insulin

## 08 ANTIDIARRHEALS

- |               |                  |
|---------------|------------------|
| 1. Cremomycin | 5. Bacid         |
| 2. Kaomycin   | 6. Kaopectate    |
| 3. Lomotil    | 7. Furoxone      |
| 4. Podelamine | 8. Paregoric     |
|               | 9. Cremosuxidine |

09

## ANTIEMETICS

- |               |               |
|---------------|---------------|
| 1. Antivert-T | 4. Tigan      |
| 2. Compazine  | 5. Benedectin |
| 3. Dramamine  | 6. Bonadoxin  |

10

## ANTIFUNGAL AGENTS

- |                      |                            |
|----------------------|----------------------------|
| 1. Akrinol Cream     | 9. Mycena Cream            |
| 2. Desenex           | 10. Dalidyne               |
| 3. Gentian Violet    | 11. Tineatron              |
| 4. Mycolog Cream     | 12. Tinactin               |
| 5. Mycostatin        | 13. Nystaform-HC           |
| 6. Racet Cream       | 14. Cortisone Cream        |
| 7. Sporostacin Cream | 15. Nystatin Cream         |
| 8. Caldecort Cream   | 16. Gentian Red Suspension |
|                      | 17. Caldesene              |

11

## ANTHELMINTHICS

1. Bryrel
2. Hexysol
3. Piperazine
4. Tetrachloroethylene
5. Mintezol
6. Oxyuricel

12

## ANTIHISTAMINES

- |               |                    |
|---------------|--------------------|
| 1. Benadryl   | 7. Triaminic       |
| 2. Disomer    | 8. Wans            |
| 3. Phenergan  | 9. Deconamine      |
| 4. Polaramine | 10. Clistin        |
| 5. Sinutab    | 11. Periactin HCl  |
| 6. Tacaryl    | 12. Chlor-Trimeton |

13

## ANTIHYPERTENSIVE AGENTS

1. Serpasil
2. Anatsol
3. Aldomet (Methyldopa)
4. Reserpine
5. Apresoline

14

## ANTIRHEUMATIC AGENTS

1. Butazolidin
2. Decagesic
3. Pabalate
4. Nervithrop
5. Thyocill

## 15 ANTISEPTICS AND DISINFECTANTS

1. Cepacol
2. Iodex
3. Yellow Mercuric Oxide
4. Chloraseptic
5. Silver Nitrate
6. Zephiran Chloride
7. Mercuricrome

## 16 ANTISPASMODICS

- |               |                  |
|---------------|------------------|
| 1. Atropine   | 7. Levsin        |
| 2. Belladanal | 8. Librax        |
| 3. Bentyl     | 9. Piptal        |
| 4. Combid     | 10. Pro-Banthine |
| 5. Donatal    | 11. Espasmotex   |
| 6. Estomul    | 12. Valpin       |
|               | 13. Belladonna   |

## 17 ANTITRICHOMONAL AGENTS

1. A.V.C. Cream
2. Flagyl

## 18 ANTITUBERCULOUS AGENTS

## 19 ANTITUSSIVE AGENTS

- |               |                |
|---------------|----------------|
| 1. Conso Tuss | 5. Histatussin |
| 2. Endotussan | 6. Neurotuss   |
| 3. Recindal   | 7. Notussan    |
| 4. Tussar-2   | 8. Robitussin  |
|               | 9. Toax        |

## 20 ADRENAL CORTICOSTEROIDS AND CORTICOTROPIN

- |                     |                    |
|---------------------|--------------------|
| 1. Decadron         | 8. Coly-Mycin Otic |
| 2. Heb-Cor.-V Cream | 9. Prednisone      |
| 3. Kenalog          | 10. NeoPolycin     |
| 4. Neodecadron Sol. | 11. Corticotropin  |
| 5. Valisone         | 12. Solu-Cortef    |
| 6. Celestone        | 13. Hist-A-Cort-E  |
| 7. NeoCortef        | 14. Synalar        |
|                     | 15. Otocort        |

## 21 AGENTS USED TO TREAT DEFICIENCY ANEMIAS

- |                  |                      |
|------------------|----------------------|
| 1. Fergon        | 5. Fortinic          |
| 2. Mol Iron      | 6. Normoblex         |
| 3. Liver Extract | 7. Vitron-C          |
| 4. Vitamin B-12  | 8. Fortilin-Forticon |

## 22 AGENTS USED TO TREAT GOUT

1. Tendearil

- 23 AGENTS USED TO TREAT MIGRAINE  
 1. Cafegot  
 2. Migralam
- 24 ANALEPTICS  
 1. Caffeine Tab.
- 25 ANDROGENS AND ANABOLIC STEROIDS  
 1. Primotest  
 2. Winstrol-Wisteroid  
 3. Testosterone
- 26 ANORECTAL PREPARATIONS  
 1. Anusol
- 27 ANOREXIANTS  
 1. Bomadex  
 2. Tenuate
- 28 BRONCHIODILATORS  
 1. Aminet  
 2. Aminophylline  
 3. Brondecon  
 4. Elixophyllin  
 5. Epinephrine (Adrenaline)  
 6. Isuprel  
 7. Neothylline  
 8. Quibron  
 9. Ephedrine  
 10. Tedral  
 11. Marax
- 29 GENERALLY ACTING SKELETAL MUSCLE RELAXANTS  
 1. Norflex  
 2. Robaxin
- 30 CHLORAMPHENICOL AND DERIVATIVES  
 1. Chloromycetin
- 31 COLD REMEDIES  
 1. Actifed  
 2. Asafen - NAMA  
 3. Corilin  
 4. Disophrol  
 5. Ornade (M)  
 6. Larylgan  
 7. Vita-Numonyl
- 32 DERMATOLOGIC AGENTS  
 1. Domeboro  
 2. Phisohex  
 3. Podophyllin  
 4. Bengay  
 5. Caolmine Lotion  
 6. Caladryl  
 7. Whitefield's Oint.  
 8. Balmafex Liniment
- 33 DIGITALIS GLYCOSIDES  
 1. Cedilanid  
 2. Digitoxin

## 34 DIURETICS

1. Naqua
2. Diuril
3. Diamox

## 35 ENZYMES USED AS DRUGS

- |                     |                    |
|---------------------|--------------------|
| 1. Chymoral         | 4. Stamyl          |
| 2. Papase           | 5. Orenzyme (M)    |
| 3. Biozyme Ointment | 6. Chymar Ointment |

## 36 ERYTHROMYCIN AND DERIVATIVES

1. Erythromycin
2. Ilosone

37 ESTROGENS, PROGESTOGENS, ORAL CONTRACEPTIVES,  
AND OVULATORY AGENTS

1. Amnestrogen
2. Diethylstilbestrol
3. Premarin
4. Gestest
5. Provera
6. Progesterone

## 38 EXPECTORANTS AND INHALANTS

1. Hydrillium
2. Dorosin
3. Benylin
4. Flemalin

## 39 LAXATIVES AND AGENTS AFFECTING FECAL CONSISTENCY

- |                           |                    |
|---------------------------|--------------------|
| 1. Agoral                 | 6. Mineral Oil     |
| 2. Colace                 | 7. Sodium Sulfide  |
| 3. Dicolax                | 8. Exlax           |
| 4. Glycerin Suppositories | 9. Milkinol        |
| 5. Koidremul              | 10. Mag. Sulfate   |
|                           | 11. Sodium Sulfate |

## 40 LOCAL ANESTHETICS

1. Auralgan
2. Butesin Picerate Ointment
3. Pontocaine Hydrochloride
4. Dermoplast
5. Procaine HCl
6. Tetracaine HCl

## 41 MILD ANALGESICS

- |              |                      |
|--------------|----------------------|
| 1. Ascriptin | 10. Besaprin         |
| 2. Buffadyne | 11. ASA              |
| 3. Dipyron   | 12. Darvon           |
| 4. Equagesic | 13. Indocin          |
| 5. Fiorinal  | 14. Parafon Forte    |
| 6. Novaldin  | 15. Empirin Compound |
| 7. Ponstel   | 16. Tylenol          |
| 8. Robaxisol | 17. Norgesic         |
| 9. Tempa     | 18. APC              |
|              | 19. Nervidol         |

## 42 MISCELLANEOUS ANTIBACTERIAL AGENTS

- |                    |                           |
|--------------------|---------------------------|
| 1. Cleocin HCl     | 11. Alba Forte            |
| 2. Mandelamine     | 12. Geramycin             |
| 3. Myciguant       | 13. Neomycin Cream        |
| 4. NegGram         | 14. Neosporin (Oph. Sol.) |
| 5. Lincocin        | 15. Bacitracin            |
| 6. Streptomycin    | 16. Cortispirin M         |
| 7. Tetracet        | 17. Pyridium              |
| 8. Urbamine        | 18. NeoPolycin            |
| 9. Alba-3-Cream    | 19. Wybiotic Trohes       |
| 10. Albaform Cream | 20. Hlprex                |
|                    | 21. Declostatin           |

## 43 IMMUNOLOGIC AGENTS

1. Tetanus Toxoid

## 44 MISCELLANEOUS GASTROINTESTINAL AGENTS

1. Emetrol
2. Universal Antidote
3. Brewers Yeast
4. Festal
5. Kustrase
6. Kc-Zyme

## 45 NASAL DECONGESTANTS

1. Afrin
2. Neo-Synephrine
3. NTZ
4. Verdefam

## 46 NITROFURANS

1. Furacin
2. Furozone
3. Furadantin

- 47      OPTHALMIC PREPARATIONS
- |                       |                    |
|-----------------------|--------------------|
| 1. Vasocon            | 4. Dacriose        |
| 2. Vasocidin Ophth.   | 5. Basocon         |
| 3. Corticospirin Otic | 6. Saline Eye Wash |
|                       | 7. Metymid         |
- 48      OXYTOCICS
1. Ergotrate (M)
- 49      PENICILLINS
- |                |               |
|----------------|---------------|
| 1. Amcill      | 4. Penicillin |
| 2. Benzetacil  | 5. Polycillin |
| 3. Beta Pen-VK | 6. Principen  |
- 50      PERIPHERAL VASODILATORS
1. Arlidin
2. Vasodilan
- 51      REPLENISHERS AND REGULATORS OF WATER,  
ELECTROLYTES, AND NUTRIENTS
1. Travert
2. Vitamin K
- Glucose 5% D/W
- 52      SEDATIVES AND HYPNOTICS
1. Doriden
2. Luminal
3. Phenobarbital
4. Sedadrops
5. Donphen
- 53      STRONG ANALGESICS
1. Talwin
2. Demerol
- 54      SULFONAMIDES
- |                       |                 |
|-----------------------|-----------------|
| 1. Azogantrisin       | 4. Sultrin      |
| 2. Gantrisin          | 5. Sulfem Cream |
| 3. Sulfatiazole Cream | 6. Triple Sulfa |
|                       | 7. Sulfa Ophth. |

## 55 THYROID HORMONES AND ANTITHYROID AGENTS

1. Proloid
2. Euthroid
3. Synthroid

## 56 TETRACYCLINES

- |                |                  |
|----------------|------------------|
| 1. Acromycin   | 4. Tetrachel     |
| 2. Azotrex (M) | 5. Tetraeyclines |
| 3. Declomycin  | 6. Tetfex        |
|                | 7. Vibramycin    |

## 57 TOPICAL OTIC PREPARATIONS

1. Otobiotic
2. Cerumenex Drops

## 58 VITAMINS AND SOURCES OF VITAMINS

- |               |              |
|---------------|--------------|
| 1. Tri-Vi-Sol | 6. Raricel   |
| 2. Vitamin-A  | 7. Lysivit   |
| 3. Vitamin-C  | 8. Natalins  |
| 4. Vitamin-D  | 9. Pancebrin |
| 5. Gevral     | 10. Meriten  |
|               | 11. Betalin  |

## 59 OTHER DRUGS

Non-Identifiable

- |              |                      |
|--------------|----------------------|
| 1. Plaxitone | 4. Betasymplex       |
| 2. Debril    | 5. Kinesea           |
| 3. Berrylin  | 6. Anosan Powder     |
|              | 7. Rheumatoid Factor |

## 60 NON-DRUG TREATMENT

1. Physical Examination
2. Work Excuse Request
3. Referral
4. Prenatal Exam

## 61 ANTIMALARIAL AGENTS

1. Atabrine HCl
2. Aralen



ANNEX 3

PRESUMPTIVE PATIENT DIAGNOSES OF THE PATIENTS SEEN IN THE HEALTH  
CENTER'S OUTPATIENT CLINICS AND EMERGENCY ROOMS

Diagnostic Number	Diagnosis	Number of Patients	Average Time per Patient	Standard Deviation in time per Patient	Percent Judged Requiring a Physician
3	Enteritis and other diarrhoeal diseases	147	3.8	3.0	3
4	Tuberculosis of respiratory system	3	3.6	1.0	0
5	Other tuberculosis, including late effects	1	2.8	-0.0	0
16	Syphilis and its sequelae	3	4.1	2.1	0
17	Gonococcal infections	3	4.0	0.9	0
18	Helminthiases	75	3.0	1.4	1
19	All other infective and parasite diseases	68	3.5	2.5	9
20	Malignant neoplasms, including neoplasms of lymphatic and haematopoietic tissue	6	4.6	2.7	17
21	Benign neoplasms and neoplasms of unspecified nature	6	5.2	2.6	17
22	Thyrotoxicosis with or without goiter	2	2.3	0.8	0
23	Diabetes mellitus	55	3.3	2.2	20
24	Avitaminoses and other nutritional deficiency	6	2.8	1.3	17
25	Other endocrine and metabolic diseases	5	4.7	2.6	40
26	Anaemias	76	2.5	1.7	3

PRESUMPTIVE PATIENT DIAGNOSES OF THE PATIENTS SEEN IN THE HEALTH  
CENTER'S OUTPATIENT CLINICS AND EMERGENCY ROOMS

Diagnostic Number	Diagnosis	Number of Patients	Average Time per Patient	Standard Deviation in time per Patient	Percent Judged Requiring a Physician
27	Psychoses and non psychotic mental disorders	110	4.8	4.5	9
28	Inflammatory diseases of eye	39	3.1	2.0	5
30	Otitis media and mastoiditis	41	3.6	1.8	5
31	Other diseases of nervous system and sense organs	79	4.2	2.9	11
32	Active rheumatic fever	2	7.0	3.0	0
33	Chronic rheumatic heart disease	1	9.0	-0.0	0
34	Hypertensive disease	42	5.1	2.5	38
35	Ischaemic heart disease	9	5.2	2.2	77
36	Cerebrovascular disease	5	7.3	1.7	20
38	Other diseases of circulatory system	29	5.4	3.3	28
39	Acute respiratory infections	690	2.9	1.7	1
40	Influenza	197	3.0	3.4	1
41	Pneumonia	6	5.1	1.7	50
42	Bronchitis, emphysema and asthma	134	3.8	2.1	14
43	Hypertrophy of tonsils and adenoids	14	3.0	1.6	0
45	Other diseases of respiratory system	49	3.4	1.8	0
46	Diseases of teeth and supporting structures	26	2.6	2.5	4

PRESUMPTIVE PATIENT DIAGNOSES OF THE PATIENTS SEEN IN THE HEALTH  
CENTER'S OUTPATIENT CLINICS AND EMERGENCY ROOMS

Diagnostic Number	Diagnosis	Number of Patients	Average Time per Patient	Standard Deviation in time per Patient	Percent Judged Requiring a Physician
47	Peptic ulcer	13	5.2	2.3	31
48	Appendicitis	1	4.2	-0.0	100
49	Intestinal obstruction and hernia	7	5.2	1.2	14
50	Cholelithiasis and cholecystitis	6	3.7	2.2	17
51	Other diseases of digestive system	154	4.1	2.8	5
52	Nephritis and nephrosis	4	4.6	1.9	0
53	Calculus of urinary system	2	5.6	2.8	50
55	Other diseases of genito-urinary system	156	3.8	2.7	17
56	Abortion	2	13.5	1.0	50
57	Other complications of pregnancy, child- birth and the puerperium	15	7.5	7.6	33
59	Infections of skin and subcutaneous tissue	71	3.9	4.6	4
60	Other diseases of skin and subcutaneous tissue	127	3.6	3.4	2
61	Arthritis and spondylitis	63	3.9	2.8	8
62	Other diseases of musculoskeletal system and connective tissue	58	3.4	2.3	9

PRESUMPTIVE PATIENT DIAGNOSES OF THE PATIENTS SEEN IN THE HEALTH  
CENTER'S OUTPATIENT CLINICS AND EMERGENCY ROOMS

Diagnostic Number	Diagnosis	Number of Patients	Average Time per Patient	Standard Deviation in time per Patient	Percent Judged Requiring a Physician
63	Congenital anomalies	7	6.7	5.2	29
64	Certain causes of perinatal morbidity	1	8.0	-0.0	0
65	Other specified and ill-defined diseases	237	4.2	3.1	6
66	Fractures	29	6.0	4.3	10
67	Intracranial and internal injuries	3	3.4	1.5	0
68	Burn	9	3.1	1.6	0
69	Adverse effects of chemical substances	6	8.7	6.4	33
70	All other injuries	301	5.1	5.7	6

ANNEX 4

Physicians Judgments

		1	2	3	4	
Observer Judgments	1	6 2.0	0 .0	/	/	6 2.0
	2	12 4.0	145 48.2	15 5.0	/	172 57.2
	3	1 .3	40 13.3	82 27.2	/	123 40.8
	4	/	/	0 .0	0 .0	0 .0
		19 6.3	185 61.5	97 32.2	0 .0	301 100.

70. All other injuries

Physicians Judgments

		1	2	3	4	
Observer Judgments	1	8 3.4	2 .8	/	/	10 4.2
	2	4 1.7	77 32.5	21 8.8	/	102 43.0
	3	0 .0	12 5.1	112 47.3	/	124 52.4
	4	/	/	0 .0	1 .4	1 .4
		12 5.1	91 38.4	133 56.1	1 .4	237 100.

55. Other specified and ill-defined diseases

Physicians Judgments

		1	2	3	4	
Observer Judgments	1	10 6.4	12 7.7	/	/	22 14.1
	2	4 2.6	106 67.9	5 3.2	/	115 73.7
	3	0 .0	6 3.9	13 8.3	/	19 12.2
	4	/	/	0 .0	0 .0	0 .0
		14 9.0	124 79.5	18 11.5	0 .0	156 100.

55. Other diseases of the genito-urinary system

Physicians Judgments

		1	2	3	4	
Observer Judgments	1	3 1.9	1 .7	/	/	4 2.6
	2	4 2.6	88 57.1	8 5.2	/	100 64.9
	3	0 .0	15 9.7	34 22.1	/	49 31.8
	4	/	/	1 .7	0 .0	1 .7
		7 4.5	104 67.5	43 28.0	0 .0	154 100.

51. Other diseases of the digestive system

Physicians Judgments

		1	2	3	4	
Observer Judgments	1	4 2.7	0 .0	/	/	4 2.7
	2	0 .0	96 65.3	10 6.8	/	106 72.1
	3	0 .0	10 6.8	27 18.4	/	37 25.2
	4	/	/	0 .0	0 .0	0 .0
		4 2.7	106 72.1	37 25.2	0 .0	147 100.

03. Enteritis and other  
diarrheal diseases

Physicians Judgments

		1	2	3	4	
Observer Judgments	1	13 9.7	0 .0	/	/	13 9.7
	2	3 2.2	96 71.7	7 5.2	/	106 79.1
	3	0 .0	3 2.2	12 9.0	/	15 11.2
	4	/	/	0 .0	0 .0	0 .0
		16 11.9	99 73.9	19 14.2	0 .0	134 100.

42. Bronchitis, emphysema  
and asthma

Physicians Judgments

		1	2	3	4	
Observer Judgments	1	2 1.6	0 .0	/	/	2 1.6
	2	0 .0	55 43.3	6 4.7	/	61 48.0
	3	1 .8	19 15.0	44 34.6	/	64 50.4
	4	/	/	0 .0	0 .0	0 .0
		3 2.4	74 58.3	50 39.3	0 .0	127 100.

60. Other diseases of the skin  
and subcutaneous tissue

Physicians Judgments

		1	2	3	4	
Observer Judgments	1	3 2.7	3 2.7	/	/	6 5.5
	2	4 3.6	67 60.9	10 9.1	/	81 73.6
	3	0 .0	6 5.5	17 15.5	/	23 20.9
	4	/	/	0 .0	0 .0	0 .0
		7 6.4	76 69.1	27 24.6	0 .0	110 100.

27. Psychosis and non-psychot-  
ic mental disorders